Elaena Bakman

Email: elaena.bakman@gmail.com
Twitter: @Elaena_Bakman
GitHub: https://github.com/Lenka72/The-Magic-of-SSISDB-Demo

PASS SQLSATURDAY

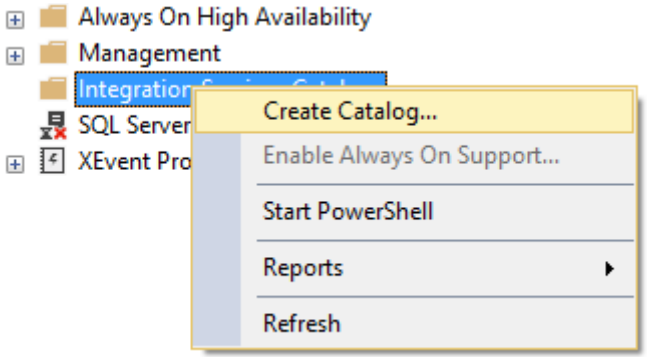
The Magic of SSISDB

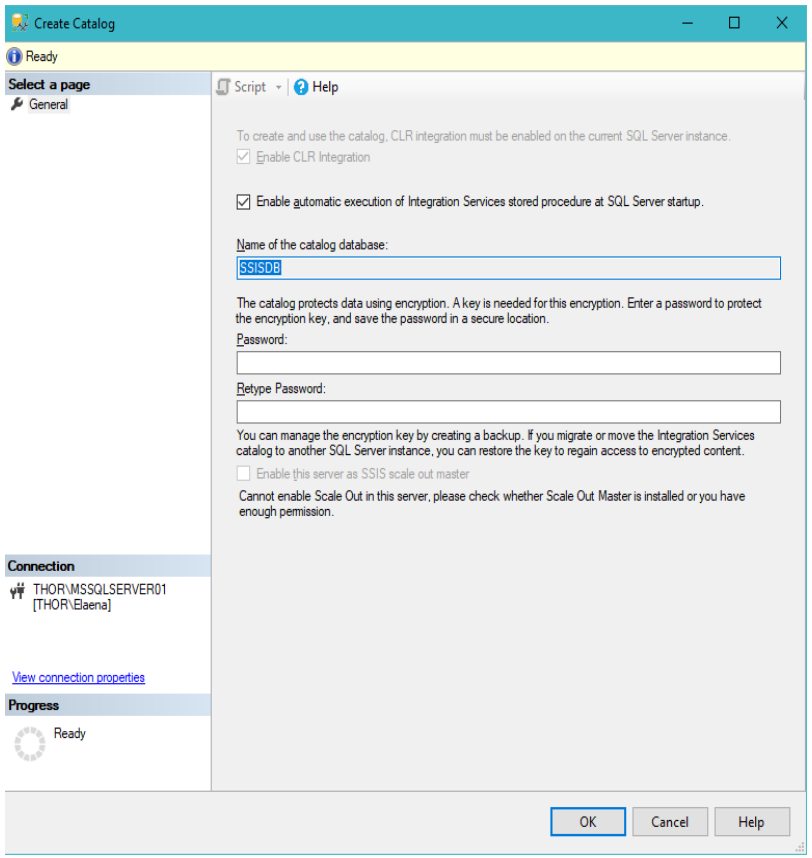
Creative use of Environment Variables and More


BACKSTORY

Integration Services Catalogs

To set up a new Integration Services Catalog…





SSISDB

SSISDB is the central point for working with the Integration Services Catalogs. There are two schemas in SSISDB:

- Catalog
- Internal

SQLQuery1.sql - TH...(THOR\Elaena (61))*

```
USE SSISDB
GO

SELECT TABLE_SCHEMA
     ,TABLE_TYPE
FROM INFORMATION_SCHEMA.TABLES
GROUP BY TABLE_SCHEMA
     ,TABLE_TYPE
ORDER BY TABLE_SCHEMA;
```

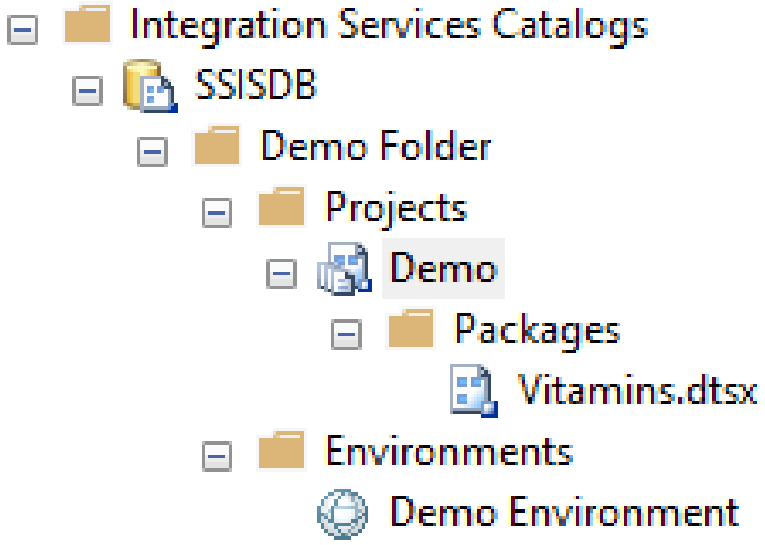
100 %

Results | Messages

	TABLE_SCHEMA	TABLE_TYPE
1	catalog	VIEW
2	internal	BASE TABLE
3	internal	VIEW

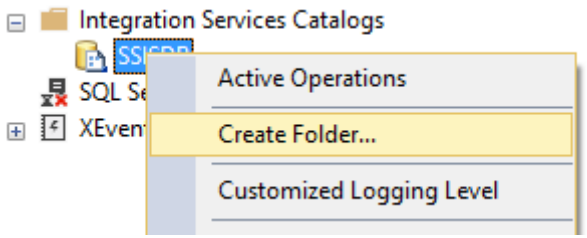
Catalog Object Identifiers

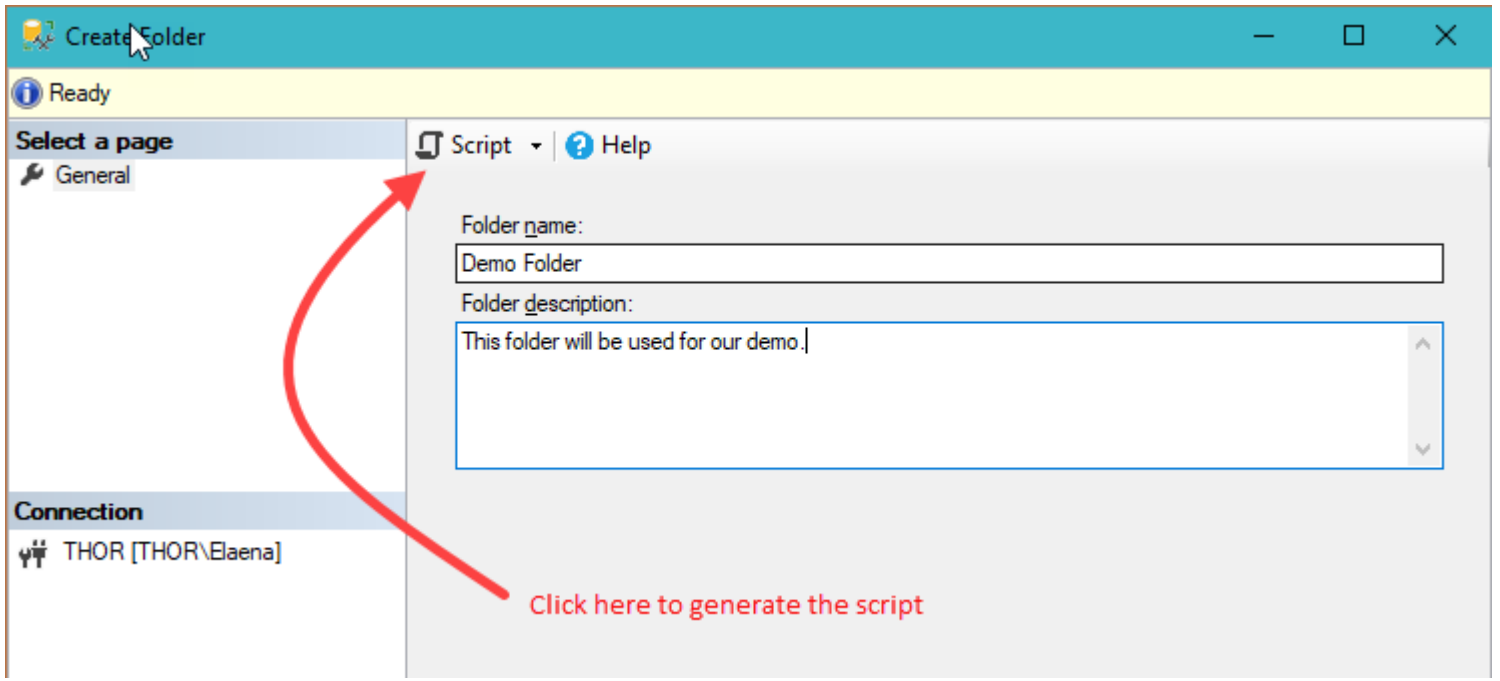
- Folder
  - Project
    - Packages
  - Environment
    - Environment Variable



Create a Folder (Otpion1)

Using Management Studio:





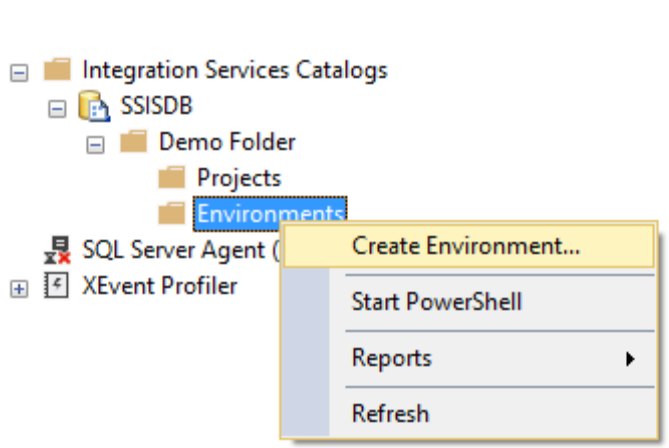
Create a Folder (Option 2)

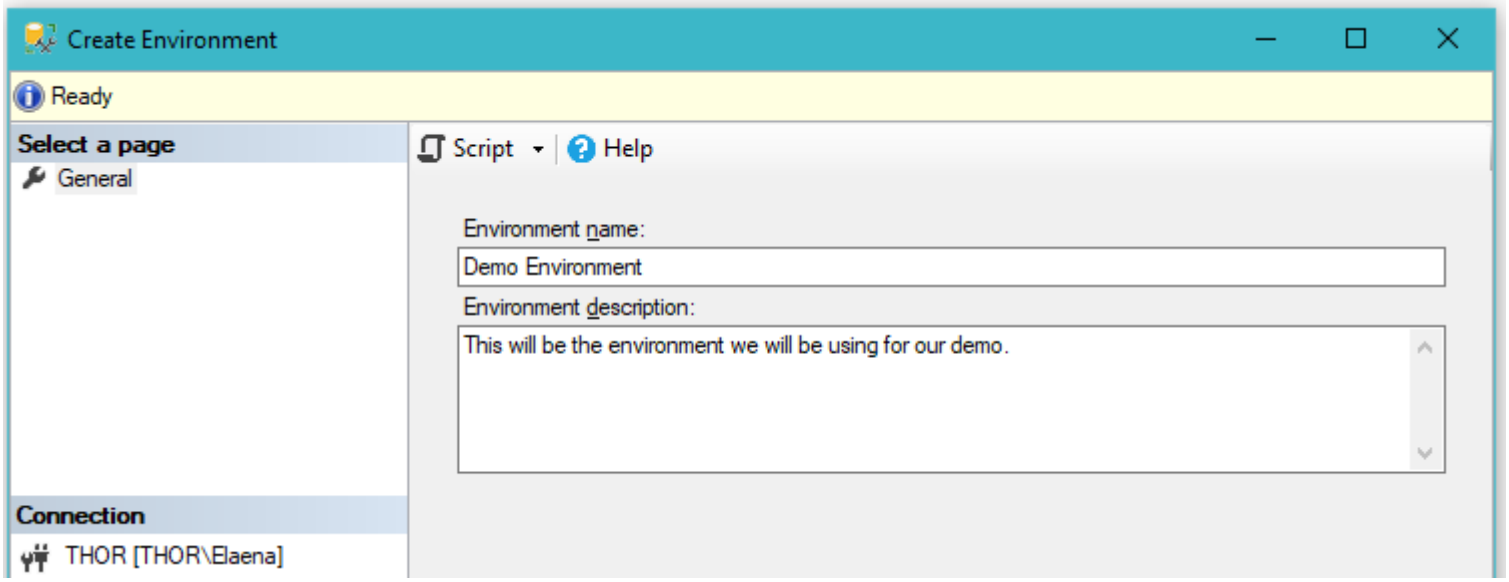
Scripting:

```
--create SSISDB folder

DECLARE @folder_name NVARCHAR(128)
       ,@folder_id BIGINT;

SET @folder_name = N'Demo Folder';

IF NOT EXISTS (SELECT   1 FROM  catalog.folders WHERE   name = @folder_name)
BEGIN
        EXEC SSISDB.catalog.create_folder @folder_name = @folder_name
                                         ,@folder_id = @folder_id OUTPUT;

        SELECT  @folder_id;

        EXEC SSISDB.catalog.set_folder_description @folder_name = @folder_name
                                                  ,@folder_description = N'This folder will hold the paramters for things you may want to use.';
END;
GO
```

Create an Environment (Option 1)

Using Management Studio:





Create an Environment (Option 2)

Scripting:

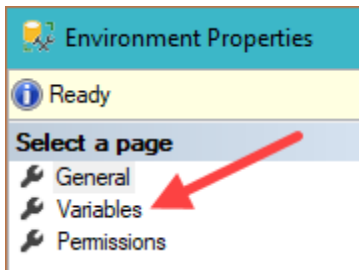
```
--add a new environment

DECLARE @folder_name NVARCHAR(128)
       ,@environment_name sysname;

SET @folder_name = N'Demo Folder';
SET @environment_name = N'Demo Environment';

IF NOT EXISTS
(SELECT         1
 FROM           catalog.folders F
 INNER   JOIN   catalog.environments E
 ON E.folder_id = F.folder_id
 WHERE          F.name = @folder_name
                AND E.name = @environment_name)
BEGIN
        IF EXISTS (SELECT   1 FROM  catalog.folders F WHERE F.name = @folder_name)
        BEGIN
                EXEC SSISDB.catalog.create_environment @environment_name = @environment_name
                                                      ,@environment_description = N'This will be the environment we will be using for our demo.'
                                                      ,@folder_name = @folder_name;
        END;
END;
GO
```

Add a Variable (Option 1)

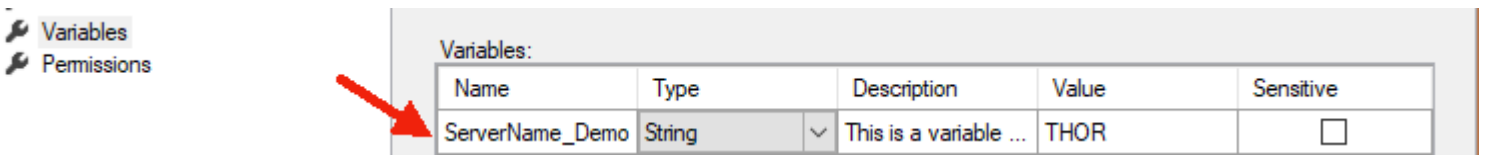
Using Management Studio:

1. Double-click on the environment name:

2. In the Environment Properties window click on “Variables” under “Select a page…”



3. Add the Name, Type, Description and Value for your variable:



Add a Variable (Option 2)

Scripting:

```
DECLARE @folder_name NVARCHAR(128)
       ,@environment_name sysname
       ,@variable_name NVARCHAR(128)
       ,@var SQL_VARIANT;

SET @folder_name = N'Demo Folder';
SET @environment_name = N'Demo Environment';
SET @variable_name = N'ServerName_Damo';
SET @var = N'THOR';

IF NOT EXISTS
(SELECT         1
 FROM           catalog.folders F
 INNER   JOIN   catalog.environments E
 ON E.folder_id = F.folder_id
 INNER   JOIN   catalog.environment_variables EV
 ON EV.environment_id = E.environment_id
 WHERE          F.name = @folder_name
                AND E.name = @environment_name)
BEGIN
        EXEC SSISDB.catalog.create_environment_variable @variable_name = @variable_name
                                                       ,@sensitive = False
                                                       ,@description = N'This is a variable we are going to use for our demo.'
                                                       ,@environment_name = @environment_name
                                                       ,@folder_name = @folder_name
                                                       ,@value = @var
                                                       ,@data_type = N'String';
END;
GO
```

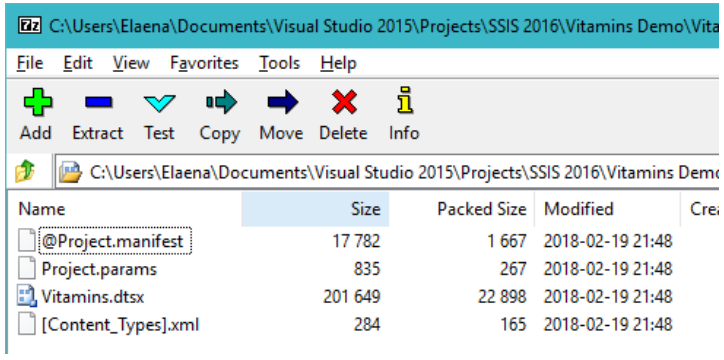
Deploying an ISPAC

1. Deploy the ISPAC using the catalog.deploy_project Stored Procedure in SSISDB.

   Expected Parameters:

   - @folder_name - The name of the folder where the project is deployed.
   - @project_name - The name of the new or updated project in the folder.
   - @projectstream - The binary contents of an Integration Services project deployment file (.ispac extension).
   - @operation_id - Returns the unique identifier for the deployment operation.

2. ISPAC is a ZIP file. You can use 7 zip to view the content. You can download it from: http://www.7-zip.org/



3. The ISPAC holds all packages in the Project. Removing one from the project would remove it from the project upon deployment.

Deploying an ISPAC

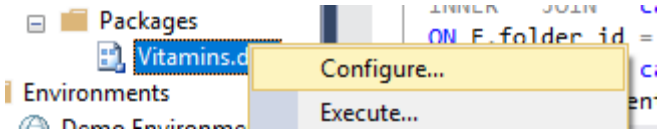
When pulling the value of the @project_stream variable make sure the location is “visible” to the server:

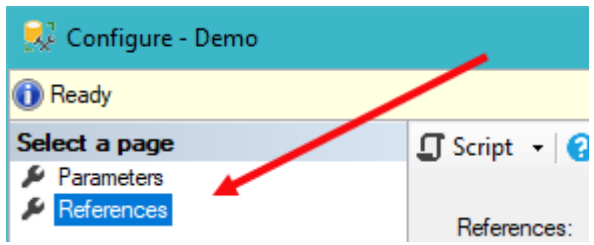
```
SET @ProjectBinary =
(SELECT     *
 FROM
            OPENROWSET(BULK
                    'C:\Users\Elaena\Documents\Visual Studio 2015\Projects\SSIS 2016\Vitamins Demo\Vitamins Demo\bin\Development\Demo.ispac'
                   ,SINGLE_BLOB)
            AS BinaryData );

EXEC catalog.deploy_project @folder_name = @FolderName
                           ,@project_name = @ProjectName
                           ,@project_stream = @ProjectBinary
                           ,@operation_id = @OperationId OUT;
GO
```

Adding an Environment Reference

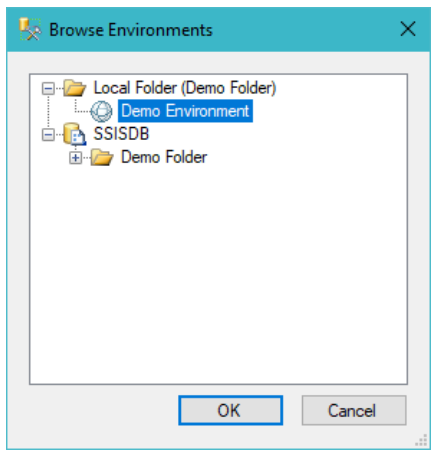
Using Management Studio:

1. Right-click on the package name:
2. Click on References:





3. Click the Add button and add the reference:



Adding an Environment Reference

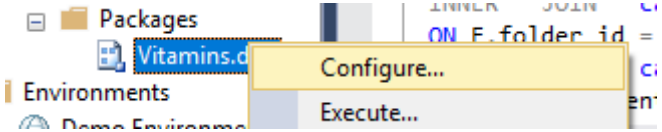
Scripting:

```
EXEC catalog.create_environment_reference @environment_name = @environment_name
                                         ,@reference_id = @reference_id OUTPUT
                                         ,@project_name = @project_name
                                         ,@folder_name = @folder_name
                                         ,@reference_type = R;
```

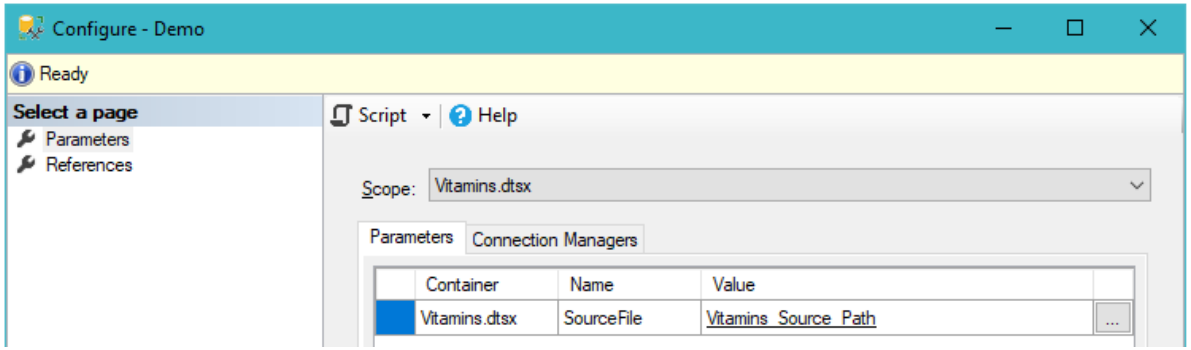
Set Object Parameter Reference (Option 1)

Using Management Studio:

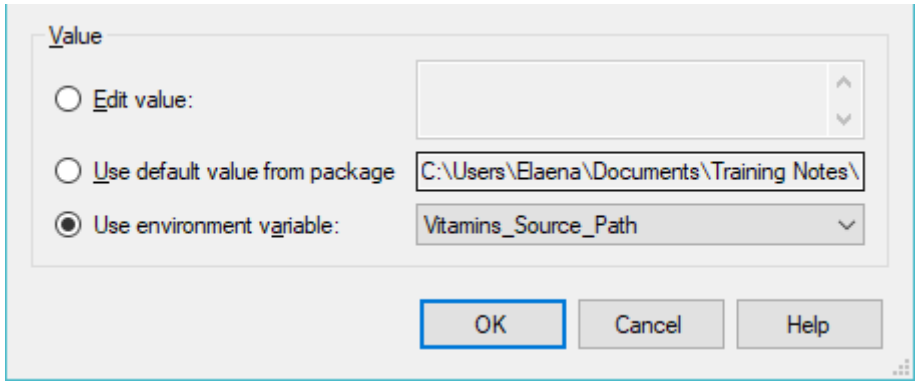
1. Right-click on a package and select the Configure option:



2. In the configure window click on the "…" to configure the object parameters:



3. In the Set Parameter Value view, select the "Use environment variable" option:



Set Object Parameter Reference (Option 2)

Scripting:

Create a reference between the package or project parameters and the environment variables.

```
EXEC SSISDB.catalog.set_object_parameter_value @object_type = 20
                                              ,@parameter_name = N'SQL_Server_Name'
                                              ,@object_name = N'Demo'
                                              ,@folder_name = N'Demo Folder'
                                              ,@project_name = N'Demo'
                                              ,@value_type = R
                                              ,@parameter_value = N'Vitamins_SQL_Server_Name';
GO
```

Use Case for Getting the Value of a Variable

Example 1: set a different directory for the source file based on your environment (Development, Test and Production).

```
        ,@BaseDirectory VARCHAR(256);

SET @ReportDate = EOMONTH(GETDATE(), -1);
SET @DateKey = CONVERT(CHAR(8), @ReportDate, 112);
SET @UserId = dbo.fn_get_process_started_by_uerid('Valuation - EBO Anchor Values Set Population');

SET @BaseDirectory = dbo.fn_get_environment_parameter_value('Valuation', 'Valuation', 'BaseDirectory_WLA');

SET @SourceFile = @BaseDirectory + '\' + CAST(@DateKey AS CHAR(8)) + ' - Monthend\Database\Initial Values Import\S&D Va

DECLARE @SQL NVARCHAR(MAX);

SET @SQL = '    BULK INSERT #SourcePopulation
        FROM        ''' + @SourceFile + '''
        WITH
        (
            FIRSTROW = 2,
            ROWTERMINATOR = ''\n'',
            FIELDTERMINATOR = ','''
        );
    ';

EXECUTE (@SQL);
```

Use Case for Getting the Value of a Variable

Example 2: checking to see if the process is running on the production server and choosing a different action based on that information.

1. A function is used to pull the name of the production server:

```
SET @ProductionServerName = dbo.fn_get_environment_parameter_value('Valuation', 'Valuation', 'ProductionServerName');
```

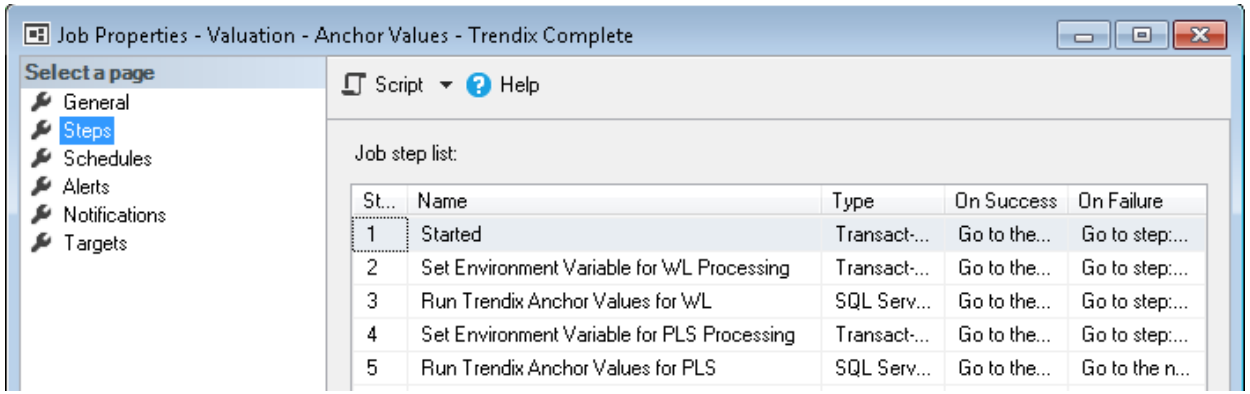
2. Check the name of the production server against the @@SERVERNAME value. In this case we add a CC on the email to notify the user, the dev team in case of a failure in the production environment only:

```
IF @Status = 'Failed'
    BEGIN
        SET @EmailBody = @EmailBody + 'Please try again or contact your developer to address the issue.' + @CrLf;
        SET @EmailBody = @EmailBody + ISNULL(dbo.fn_get_job_failed_error_message(@ProcessName) + @CrLf, '');
        -- add the ProcessId to the failure notification so that it can be tied to a redline ticket if one needs to be created
        SET @EmailBody = @EmailBody + @CrLf + ISNULL('Process Id: ' + LTRIM(CAST(@ProcessId AS VARCHAR(6))) + @CrLf, '');

        -- only sent notifications to the valuationsupport@pnmac.com and marcus.vazquez@pnmac.com team when the job fails in prodution
        IF @@SERVERNAME = @ProductionServerName
            SET @CopyEmail = 'valuationsupport@p                              .com;';
    END;
SET @EmailBody = @EmailBody + @CrLf + 'Thanks,' + @CrLf + 'Development Team';
EXEC msdb.dbo.sp_send_dbmail @recipients = @Email, @copy_recipients = @CopyEmail, @subject = @EmailSubject, @body = @EmailBody;
```

Use Case for Setting the Value of a Variable

Example:

This job runs the same SSIS Package twice but processing two different sets of records by first setting the environment variable to one value, and than to another value (step 2 and 4 set the values):

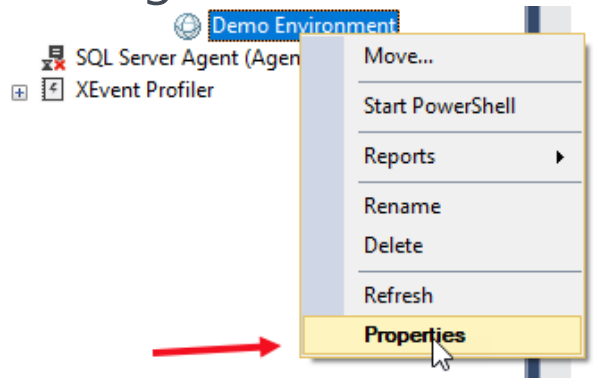


Setting the value:

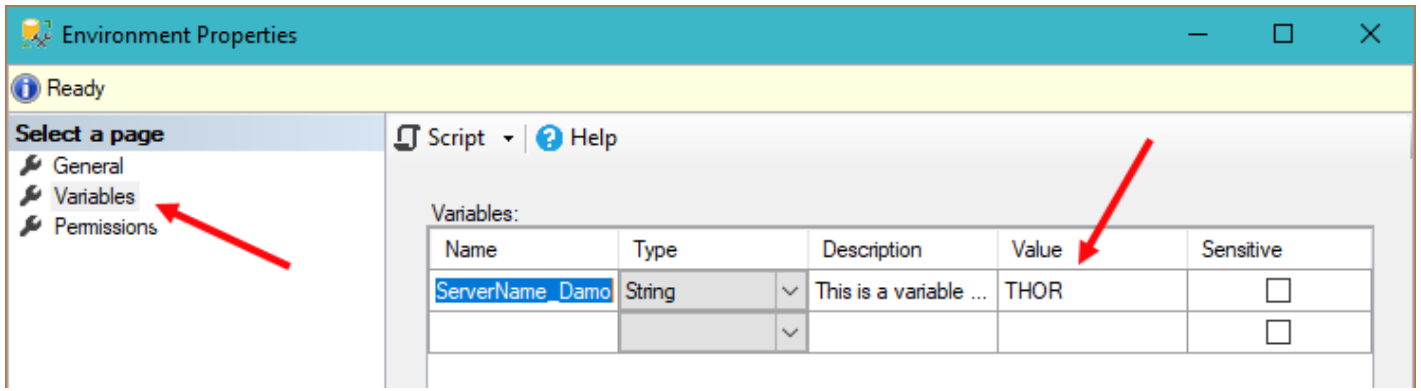
Set a Variable Value (Option 1)

Using Management Studio:

1. Right-click on the environment name and go to Properties:



2. Go to the Variables tab and change the value:



Set a Variable Value (Option 2)

Scripting:

Using the catalog.set_environment_variable_value Stored Procedure in the SSISDB database:

```
CREATE PROCEDURE dbo.usp_set_environment_variable_value (
        @FolderName NVARCHAR(128)
       ,@EnvironmentName NVARCHAR(128)
       ,@EnvironmentVariableName NVARCHAR(128)
       ,@ParameterValue SQL_VARIANT)
AS
BEGIN
        SET NOCOUNT ON;

        EXEC SSISDB.catalog.set_environment_variable_value @folder_name = @FolderName
                                                          ,@environment_name = @EnvironmentName
                                                          ,@variable_name = @EnvironmentVariableName
                                                          ,@value = @ParameterValue;

END;
GO
```

Retrieving the Value of a Variable

Create a function to retrieve the value of a variable

```
CREATE FUNCTION dbo.fn_get_environment_variable_value (
        -- Add the parameters for the function here
        @FolderName NVARCHAR(128)
       ,@EnvironmentName NVARCHAR(128)
       ,@EnvironmentVariableName NVARCHAR(128))
RETURNS VARCHAR(4000)
AS
BEGIN
        -- Declare the return variable here
        DECLARE @ParameterValue VARCHAR(4000);

        -- Add the T-SQL statements to compute the return value here
        SELECT  @ParameterValue =
        (SELECT         CONVERT(VARCHAR(256), EV.value) AS BaseDirectory
         FROM           SSISDB.catalog.folders F
         INNER   JOIN   SSISDB.catalog.environments E
         ON F.folder_id = E.folder_id
         INNER   JOIN   SSISDB.internal.environment_variables EV
         ON E.environment_id = EV.environment_id
         WHERE          (F.name = @FolderName)
                        AND (E.name = @EnvironmentName)
                        AND EV.name = @EnvironmentVariableName);

        -- Return the result of the function
        RETURN @ParameterValue;
END;
GO
```

Retrieving the Value of a Variable

1. Pulling the value into a variable:

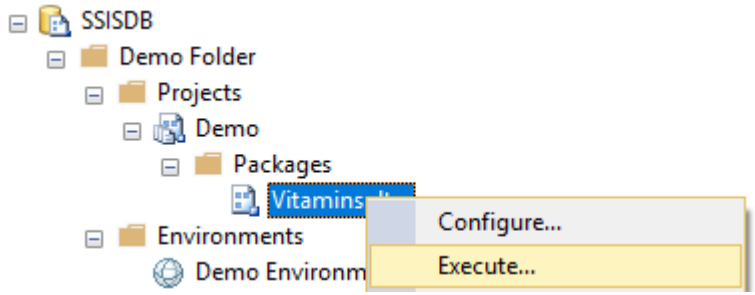
```
--option 1 - setting a variabl value

DECLARE @MyServerName VARCHAR(25);

SET @MyServerName =
(SELECT dbo.fn_get_environment_variable_value('Demo Folder', 'Demo Environment', 'ServerName_Damo'));

PRINT @MyServerName;

GO
```

2. Using it in a select statement:

```
--option 2 - in a SELECT Statement

SELECT dbo.fn_get_environment_variable_value('Demo Folder', 'Demo Environment', 'ServerName_Damo');
```

Executing a Package

1. Execute by right-clicking on the package:



2. Scripting:

```
CREATE PROCEDURE [dbo].[usp_ssis_run_on_demand] (
       @FolderName NVARCHAR(MAX)
      ,@ProjectName NVARCHAR(MAX)
      ,@PackageName NVARCHAR(MAX))
AS
BEGIN
       SET NOCOUNT ON;

       DECLARE @ExecutionId BIGINT
              ,@ReferenceId AS INT;

       SET @ReferenceId =
       (SELECT     ER.reference_id
        FROM       SSISDB.catalog.environment_references ER
        INNER   JOIN SSISDB.catalog.projects P
        ON P.project_id = ER.project_id
        WHERE      P.name = @ProjectName);

       EXECUTE SSISDB.catalog.create_execution @folder_name = @FolderName
                                              ,@project_name = @ProjectName
                                              ,@package_name = @PackageName
                                              ,@reference_id = @ReferenceId
                                              ,@execution_id = @ExecutionId OUTPUT;

       EXECUTE SSISDB.catalog.start_execution @execution_id = @ExecutionId;
END;
GO
```

SSRS Report to View Status and Execute

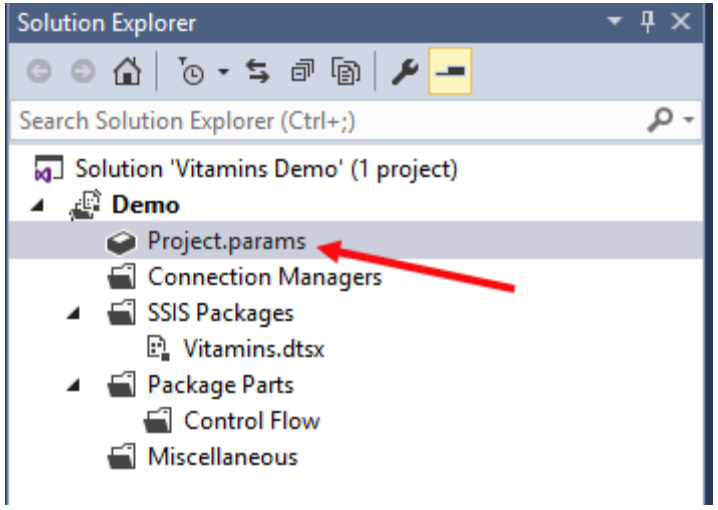
Knowing the relationship between the Folder, Project, Environment, Environment Variables and other related objects would allow you to recreate the All Executions and All Messages reports in SSRS and make them available to your developers without having to grant them access to the Integration Services Catalog in Production.

Folder Name	Project Name	Package Name	Status	Execution Id	Use32Bit At Runtime	Start Date Time	End Date Time	Duration	Caller Name
⊟Demo Folder									
	⊟Demo								
		⊟Vitamins.dtsx							
			Failed	10*	False	02/25/2018 09:43 PM	02/25/2018 09:43 PM	4.993	MicrosoftAccount\open.seseme@outlook.com
			Failed	9*	False	02/25/2018 09:03 PM	02/25/2018 09:04 PM	9.326	MicrosoftAccount\open.seseme@outlook.com
			Succeeded	8*	False	02/25/2018 01:58 AM	02/25/2018 01:59 AM	21.934	MicrosoftAccount\elaena.bakman@gmail.com
		Failed:	2	Succeeded:	1				

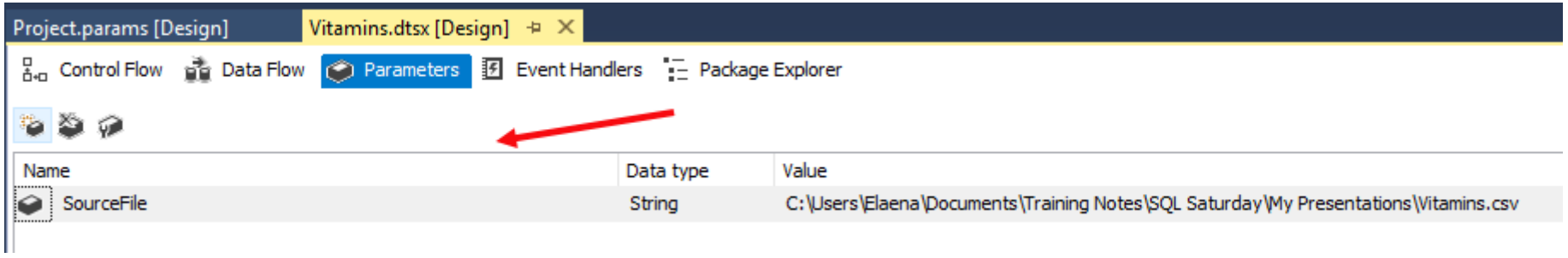
Message Code	Message	Message Source Name	Event Name	Message Time	Execution Path	Package Path	Message Source Id	Environment
-2147381246	Vitamins:Warning: SSIS Warning Code DTS_W_MAXIMUMERRORCOUNTREACHED. The Execution method succeeded, but the number of errors raised (1) reached the maximum allowed (1); resulting in failure. This occurs when the number of errors reaches the number specified in MaximumErrorCount. Change the MaximumErrorCount or fix the errors.	Vitamins	OnWarning	02/25/2018 09:04:02	\Vitamins	\Package	{F7A96B02-50DB-4B1E-8B3D-670C10EFAF35}	-
	Vitamins:Finished, 9:04:02 PM, Elapsed time: 00:00:01.125.	Vitamins	OnPostExecute	02/25/2018 09:04:02	\Vitamins	\Package	{F7A96B02-50DB-4B1E-8B3D-670C10EFAF35}	-
	Script Task - Show Parameters:Finished, 9:04:02 PM, Elapsed time: 00:00:00.609.	Script Task - Show Parameters	OnPostExecute	02/25/2018 09:04:02	\Vitamins\Script Task - Show Parameters	\Package\Script Task - Show Parameters	{89384411-5E14-4F69-8E9A-2B9B78EB6383}	-
	SQL Task - Check if Staging Tables Exist - onError:Finished, 9:04:02 PM, Elapsed time: 00:00:00.125.	SQL Task - Check if Staging Tables Exist - onError	OnPostExecute	02/25/2018 09:04:02	\Vitamins\OnError\SQL Task - Check if Staging Tables Exist - onError	\Package.EventHandlers[OnError]\SQL Task - Check if Staging Tables Exist - onError	{6be591fb-00ad-4ab4-be1f-ca40a170769e}	-
1	Script Task - Show Parameters:Error: Cannot load script for execution.	Script Task - Show Parameters	OnError	02/25/2018 09:04:02	\Vitamins\Script Task - Show Parameters	\Package\Script Task - Show Parameters	{89384411-5E14-4F69-8E9A-2B9B78EB6383}	-

Project vs. Package Parameters

1. Project level parameters:



2. Package level parameters:



SSRS Report to View Status and Execute

You can use the SSRS Report to review the parameter mappings:

SSIS Parameter Value Report

Main Menu

Folder Name	Project Name	Package Name	Parameter Name	Parameter Data Type	Parameter Design Default Value	Parameter Referenced Variable Name	Environment Variable Name	Environment Variable Description	Environ Variable
⊟Demo Folder									
	⊟Demo(2/25/2018 11:47:47 PM -08:00)								
		⊟Vitamins.dtsx							
			SourceFile	String	C:\Users\Elaena\Documents\Training Notes\SQL Saturday\My Presentations\Vitamins.csv	Vitamins_Source_Path	Vitamins_Source_Path	Vitamins Demo Project fle path.	String
			SQL_Server_Name	String	THOR	Vitamins_SQL_Server_Name	Vitamins_SQL_Server_Name	Vitamins Demo Projct SQLServer name	String

… and review the parameter scope:

Environment Variable Description	Environment Variable Type	Environment Variable Value	Variable Level
Name of the vitamin to export.	String	Vitamin B12	Package
Vitamins Demo Project fle path.	String	C:\Users\Elaena\Documents\Training Notes\SQL Saturday\My Presentations\Demo Export	Package
Vitamins Demo Projct SQLServer name	String	THOR	Project

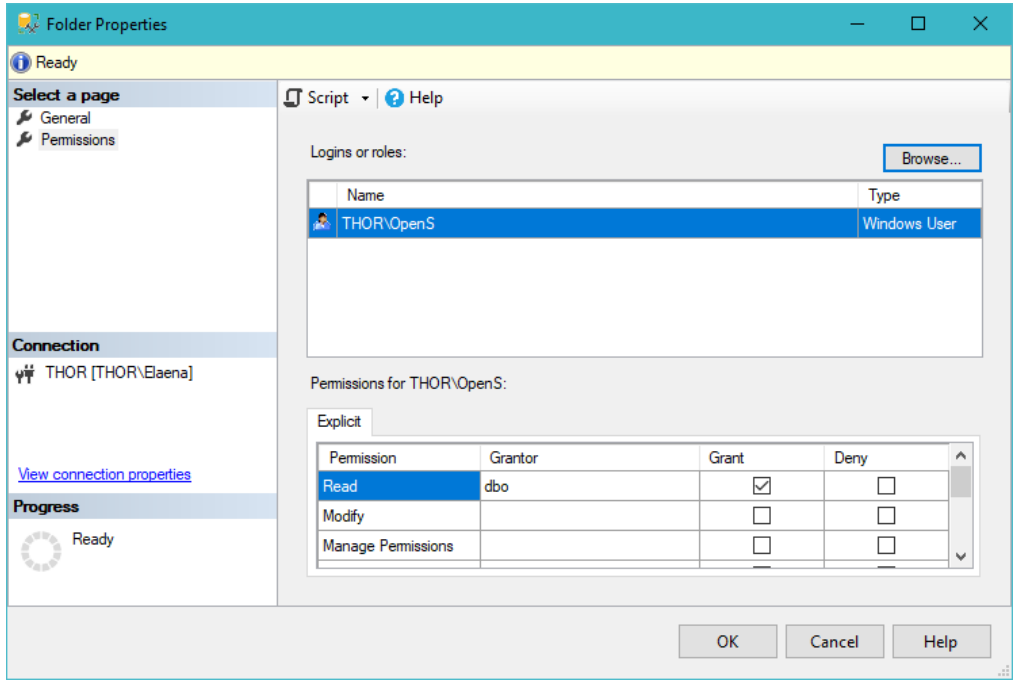
Permissions

1. Use a Windows Account to for your SSRS (one for each environment). You cannot use a SQL Server Account:

   "The operation cannot be started by an account that uses SQL Server Authentication. Start the operation with an account that uses Windows Authentication.
   A .NET Framework error occurred during execution of user-defined routine or aggregate "start_execution_internal":
   System.Data.SqlClient.SqlException: The operation cannot be started by an account that uses SQL Server Authentication. Start the operation with an account that uses Windows Authentication."

2. Grant Access to SSISDB: role member of ssis_admin.

3. Grant Access to Folder
   - Read
   - Execute Objects
   - Read Objects

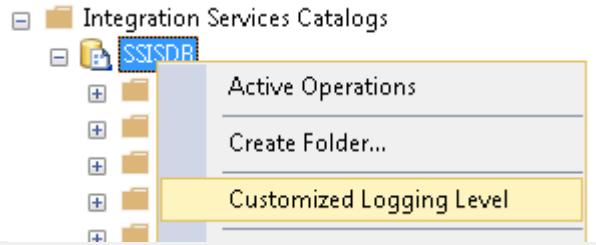


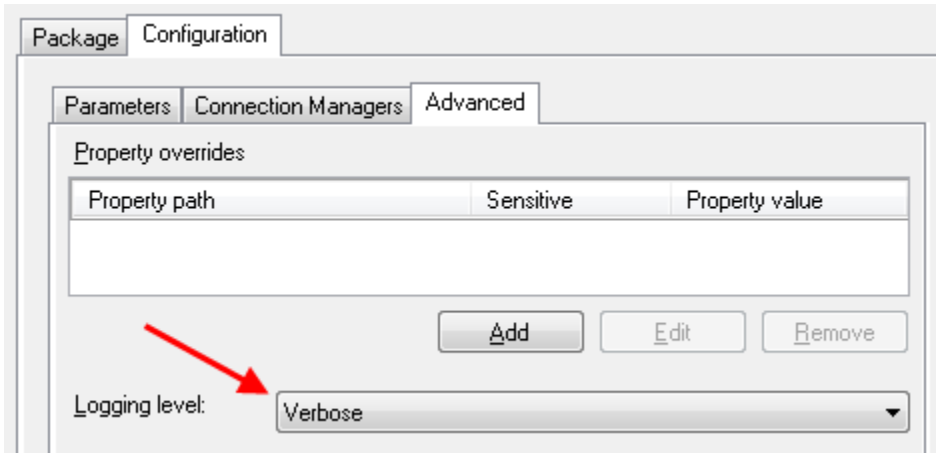
Logging

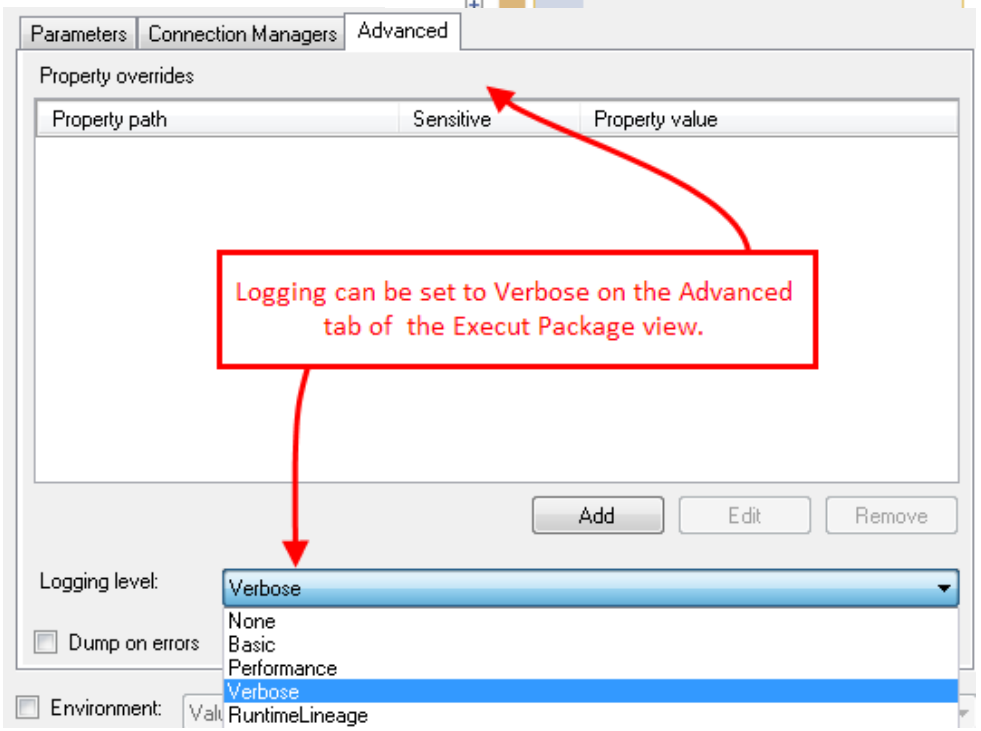
To get row counts enable “Verbose” logging.

Logging type can be changed:

1. At the catalog level:
2. When executing a package using Management Studio:
3. Job step Advanced tab under Configuration:







Demo Time

Follow me...

Email: elaena.bakman@gmail.com
Twitter: @Elaena_Bakman
GitHub: https://github.com/Lenka72/The-Magic-of-SSISDB-Demo