

TUTORIAL ON USING SSIS FOR ETL

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Microsoft SQL Server Integration Services (SSIS)

- Platform for building high performance data integration solutions, including Extraction, Transformation, and Loading (ETL) packages for Business Intelligence (BI)
- Platform includes:
 - ◆ Graphical tools and wizards for building and debugging packages
 - ◆ Tasks for performing workflow functions such as executing SQL statements, FTP operations and sending e-mail messages
 - ◆ Data sources and destinations for extracting and loading data
 - ◆ Transformations for cleaning, aggregating, merging, and copying data

SSIS Tutorial

- In this tutorial you'll learn how to use SSIS to create a simple ETL package
- The package extracts data from a single flat file source, transforms the data using two lookup transformation components, and writes that data into a destination table
- As part of the tutorial, you will learn how to create new packages, add and configure data source and destination connections, and work with new control flow and data flow components
- Later, the package is expanded to demonstrate looping, error flow and package configurations
- Based on the “SSIS How to Create an ETL Package” available at <https://docs.microsoft.com/en-us/sql/integration-services/ssis-how-to-create-an-etl-package?view=sql-server-2022>

Flat File Source Data

- Before creating a package, you need a good understanding of the source data
- Set of historical currency data contained in the flat file *SampleCurrencyData.txt*
- Has the following four columns: the average rate of the currency, a currency ID, a date, and the end-of-day rate.
- Here is an example of the data contained in the *SampleCurrencyData.txt* file (available in the exercise's Data folder):

1.00010001	ARS	9/3/2001 0:00	0.99960016
1.00010001	ARS	9/4/2001 0:00	1.001001001
1.00020004	ARS	9/5/2001 0:00	0.99990001

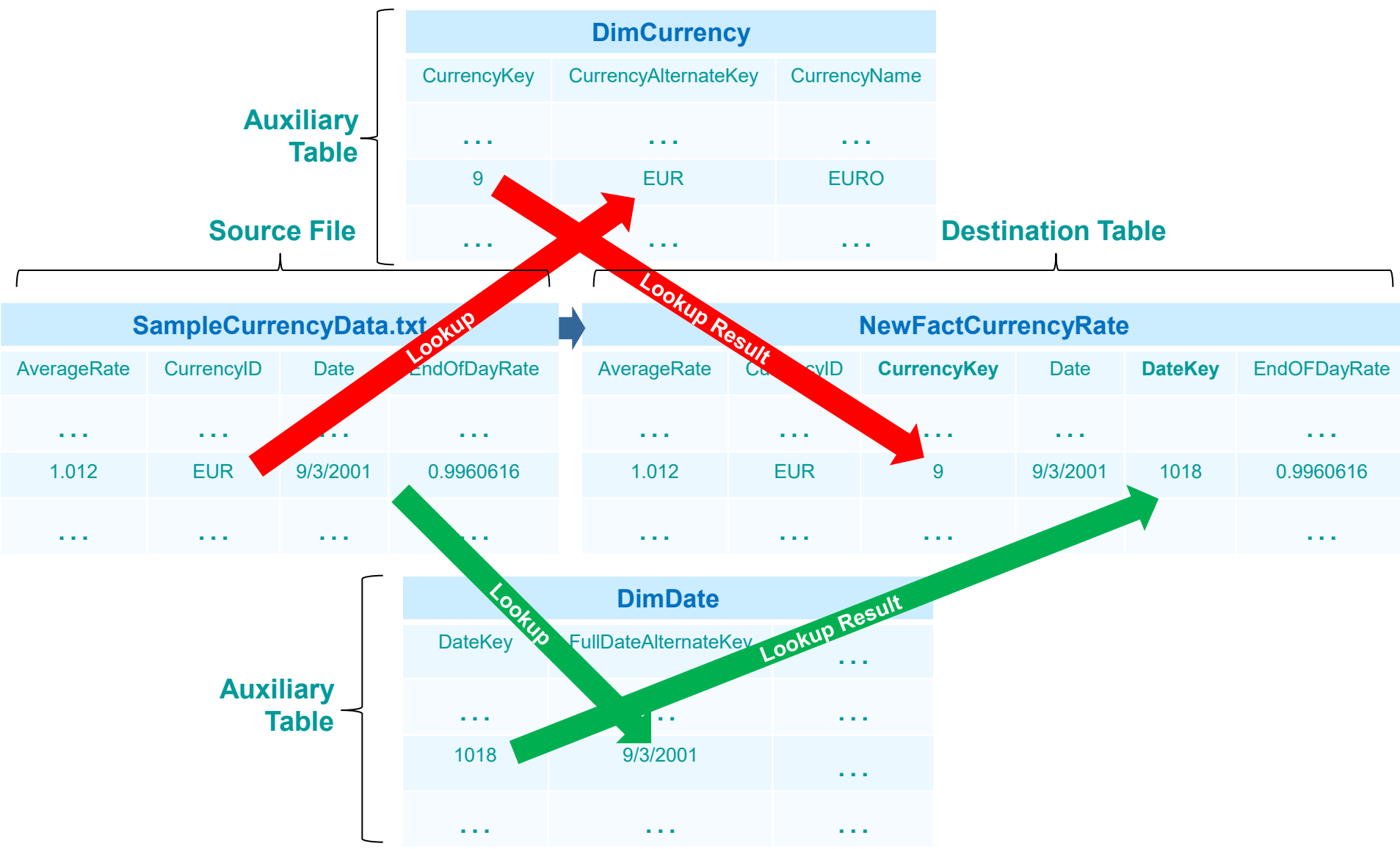
...

Destination Table

- We also need a good understanding of the data destination
- Destination for the source data is the *NewFactCurrencyRate* table in *AdventureWorksDW2022* sample database
- *NewFactCurrencyRate* fact table has four columns, and has relationships to two other tables, as shown in the following table:

Column Name	Data Type	Lookup Table	Lookup Column
AverageRate	float	None	None
CurrencyID	Nvarchar(3)	None	None
CurrencyKey	int (FK)	DimCurrency	CurrencyKey (PK)
CurrencyDate	Date	None	None
DateKey	int (FK)	DimDate	DateKey (PK)
EndOfDayRate	float	None	None

Graphical Representation of Transformations



Visual Studio 2022

Open recent

▲ Today



SSIS ETL Tutorial.sln

9/25/2023 5:03 PM

C:\Temp\PL2\SSIS ETL Tutorial

▲ Older



Teste.sln

11/10/2022 5:23 PM

C:\Users\PauloOliveira\source\repos\Teste

Let's start by creating a new project for the tutorial in *Visual Studio*.

Get started



Clone a repository

Get code from an online repository like GitHub or Azure DevOps



Open a project or solution

Open a local Visual Studio project or .sln file



Open a local folder

Navigate and edit code within any folder



Create a new project

Choose a project template with code scaffolding to get started




[Continue without code](#) →



Select the Integration Services Project template.

Create a new project

Recent project templates

-  Integration Services Project
-  Analysis Services Multidimensional and Data Mining Project
-  Blank Solution



All languages

All platforms

All project types



Import from Server (Multidimensional and Data Mining)

Creates a multidimensional and data mining project by extracting the metadata from an existing multidimensional and data mining database on an Analysis Services server.



Integration Services Project (Azure-Enabled)

This project may be used for building high performance data integration and workflow solutions that can also be run/debugged on SSIS Platform-as-a-Service (PaaS) in Azure Data Factory.



Integration Services Project

This project may be used for building high performance data integration and workflow solutions that can be run on SSIS catalog, including extraction, transformation, and loading (ETL) operations for data warehousing.



Integration Services Import Project Wizard

A wizard that assists you in creating a new Integration Services (SSIS) project that is based on an existing one. Import from a project deployment file (.ispac extension) or from an Integration Services catalog on an instance of SQL Server.



Analysis Services Tabular Project

An Analysis Services project for creating tabular models.



Import from Server (Tabular)

[Next](#)

We are going to create an Integration Services Project named *SSIS ETL Tutorial* at any location/folder we want.

Configure your new project

Integration Services Project

Project name

SSIS ETL Tutorial

Location

C:\Temp\Tutorial 1\

Solution

Create new solution

Solution name ⓘ

SSIS ETL Tutorial

☐ Place solution and project in the same directory

Back Create

Let's rename the default package name – just right click the package and select *Rename*.

Package.dtsx [Design]

Control Flow Data Flow Parameters Event Handlers Package Explorer

Solution Explorer

Search Solution Explorer (Ctrl+Q)

Connection Managers

SSIS Packages

Package.dtsx

Set as StartUp Object

Execute Package

Open

View Code

View Designer

Entry-point Package

Scope to This

New Solution Explorer View

Exclude From Project

Cut

Copy

Delete

Rename

Properties

Connection Managers

Right-click here to add a new connection manager to the SSIS package.

Change the package name to *ETL Package*.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Solution Explorer

Search Solution Explorer (Ctrl+)

Connection Managers

SSIS Packages

ETL Package.dtsx

Miscellaneous

Solution Explorer Class View

Properties

ETL Package.dtsx

Location

File Name ETL Package.dtsx

Full Path D:\Documentos\Pro

Connection Managers

Right-click here to add a new connection manager to the SSIS package.

File Name

File Name

Let's add a Connection Manager to access the flat file source data – just right click on the *Connection Managers* area and select *New Flat File Connection*.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Search Solution Explorer (Ctrl+)

In this step, we add a Flat File connection manager to the package that we just created. A Flat File connection manager enables a package to extract data from a flat file. Using the Flat File connection manager, we can specify the file name and location, the locale and code page, and the file format, including column delimiters, to apply when the package extracts data from the flat file. In addition, we can manually specify the data type for the individual columns. We must create a new Flat File connection manager for each file format that we work with.

Connection Managers

Work Offline

New OLE DB Connection...

New Flat File Connection...

New ADO.NET Connection...

New Analysis Services Connection

Getting St...

Ready

We need to provide a name for the connection manager, the flat file that we want to use (*SampleCurrencyData.txt* which is stored inside the exercise's *Data* folder), the locale, and also to unselect the option saying that the column names are in the file's first row – everything else doesn't need changes.

Sample Flat File Source Data

by the file properties and the file format.

File name: C:\Temp\Tutorial 1\Data\SampleCurrencyData.txt

Locale: English (United States)

Code page: 1252 (ANSI - Latin I)

Format: Delimited

Text qualifier: <none>

Header row delimiter: {CR}{LF}

Header rows to skip: 0

☐ Column names in the first data row

OK Cancel Help

ETL Package.dtsx

Control Flow

Connection manager name:

Description:

- General
- Columns
- Advanced
- Preview

Config

AverageRate

Column 1
Column 2
Column 3

Misc

Name	AverageRate
ColumnDelimiter	Tab (t)
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	string [DT_STR]
OutputColumnWidth	50
TextQualified	True

Name

New



Delete

Suggest Types...

OK

Cancel

Help

Because the flat file does not have column names, the Flat File connection manager creates default column names. These default names are not useful for identifying what each column represents. To make these default names more useful, we need to change the default names to names that match the destination table into which the flat file data is to be loaded. So, *column 0* should be renamed as *AverageRate*.

Flat File Connection Manager Editor

Column 1 should be renamed as *CurrencyID*.

Connection manager name:

Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate

CurrencyID

Column 2

Column 3

Misc

Name	CurrencyID
ColumnDelimiter	Tab (t)
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	string [DT_STR]
OutputColumnWidth	50
TextQualified	True

Name

New



Delete

Suggest Types...

OK

Cancel

Help

Column 2 should be renamed as *CurrencyDate*.

Flat File Connection Manager Editor

Connection manager name:

Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate
CurrencyID
CurrencyDate
Column 3

Misc

Name	CurrencyDate
ColumnDelimiter	Tab (t)
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	string [DT_STR]
OutputColumnWidth	50
TextQualified	True

New



Delete

Suggest Types...

OK

Cancel

Help

Column 3 should be renamed as *EndOfDayRate*.

Flat File Connection Manager Editor

Connection manager name:

Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate
CurrencyID
CurrencyDate
EndOfDayRate

Misc

Name	EndOfDayRate
ColumnDelimiter	{CR}{LF}
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	string [DT_STR]
OutputColumnWidth	50
TextQualified	True

New



Delete

Suggest Types...

OK

Cancel

Help

Let's change the column's data types to something that reflects their real contents – *AverageRate* should be changed to *float*.

Connection manager name: Sample Flat

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate

CurrencyID
CurrencyDate
EndOfDayRate

Misc

Name	AverageRate
ColumnDelimiter	Tab (t)
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	float [DT_R4]
OutputColumnWidth	0
TextQualified	True

DataType

New



Delete

Suggest Types...

OK

Cancel

Help

CurrencyID should be changed to *Unicode string*.

Flat File Connection Manager Editor

Connection manager name:

Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate
CurrencyID
CurrencyDate
EndOfDayRate

Misc

Name	CurrencyID
ColumnDelimiter	Tab (t)
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	Unicode string [DT_WSTR]
OutputColumnWidth	3
TextQualified	True

DataType

New



Delete

Suggest Types...

OK

Cancel

Help

CurrencyDate should be changed to *database date*.

Flat File Connection Manager Editor

Connection manager name: Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate
CurrencyID
CurrencyDate
EndOfDayRate

Misc

Name	CurrencyDate
ColumnDelimiter	Tab (t)
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	database date [DT_DBDATE]
OutputColumnWidth	0
TextQualified	True

DataType

New



Delete

Suggest Types...

OK

Cancel

Help

EndOfDayRate should be changed to float.

Flat File Connection Manager Editor

Connection manager name:

Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

Configure the properties of each column.

AverageRate
CurrencyID
CurrencyDate
EndOfDayRate

Misc

Name	EndOfDayRate
ColumnDelimiter	{CR}{LF}
ColumnType	Delimited
InputColumnWidth	0
DataPrecision	0
DataScale	0
DataType	float [DT_R4]
OutputColumnWidth	0
TextQualified	True

New



Delete

Suggest Types...

OK

Cancel

Help

In *Preview* page it's possible to see a sample of the file contents.

Flat File Connection Manager Editor

Connection manager name:

Sample Flat File Source Data

Description:

- General
- Columns
- Advanced
- Preview

The preview shows the source file divided into the specified columns. Initial data rows that are skipped when the file is parsed during runtime, are not shown.

Data rows to skip: 0

Preview rows 1-100:

AverageRate	CurrencyID	CurrencyDate	EndOfDayRate
1	USD	1/1/05 0:00	0.99980004
1	USD	1/2/05 0:00	1.000900811
1	USD	1/3/05 0:00	0.99960016
1	USD	1/4/05 0:00	1
1	USD	1/5/05 0:00	0.99960016
1	USD	1/6/05 0:00	1.00050025
1	USD	1/7/05 0:00	0.99950025
1	USD	1/8/05 0:00	1.00020004
1	USD	1/9/05 0:00	0.999200639
1	USD	1/10/05 0:00	1.00020004

Refresh

OK

Cancel

Help

After we have added a Flat File connection manager to connect to the data source, the next step is to add an OLE DB connection manager to connect to the destination table. An OLE DB connection manager enables a package to extract data from or load data into any OLE DB-compliant data source. Using the OLE DB Connection manager, we can specify the server, the authentication method, and the default database for the connection.

To add a Connection Manager just right click on the *Connection Managers* area and select *New OLE DB Connection*.

Connection Managers

Sample Flat File Source Data

Work Offline

New OLE DB Connection...

New Flat File Connection...

New ADO.NET Connection...

New Analysis Services Connection...

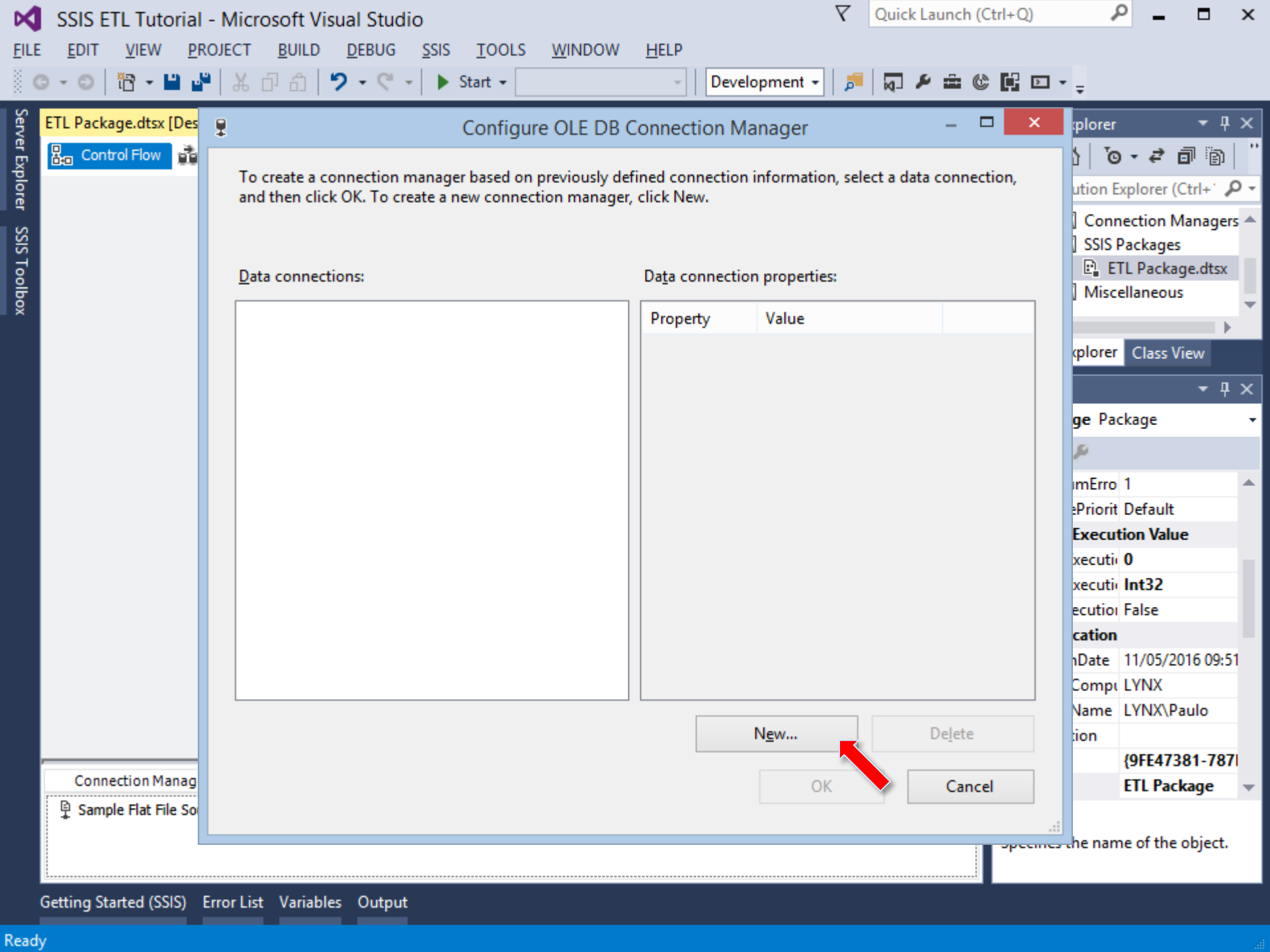
Properties

ETL Package Package

MaximumError	1
PackagePriority	Default
Forced Execution Value	
ForcedExecution	0
ForcedExecutionInt32	Int32
ForceExecution	False
Identification	
CreationDate	11/05/2016 09:51
CreatorComputerName	LYNX
CreatorName	LYNX\Paulo
Description	
ID	{9FE47381-7871-4...
Name	ETL Package

Name

Specifies the name of the object.



Server Explorer SSIS Toolbox

ETL Package.dtsx

Control Flow

Connection Manager

Sample Flat F

Connection Manager

Provider: Native OLE DB\Microsoft OLE DB Driver for SQL Server

OLE DB Provider:
Microsoft OLE DB Driver for SQL Server

Enter a server or file name

Server or file name: (local)

Location:

Log on to the server

☒ Use Windows NT Integrated Security

☐ Use a specific user name and password:

User name:

Password:

☐ Blank password

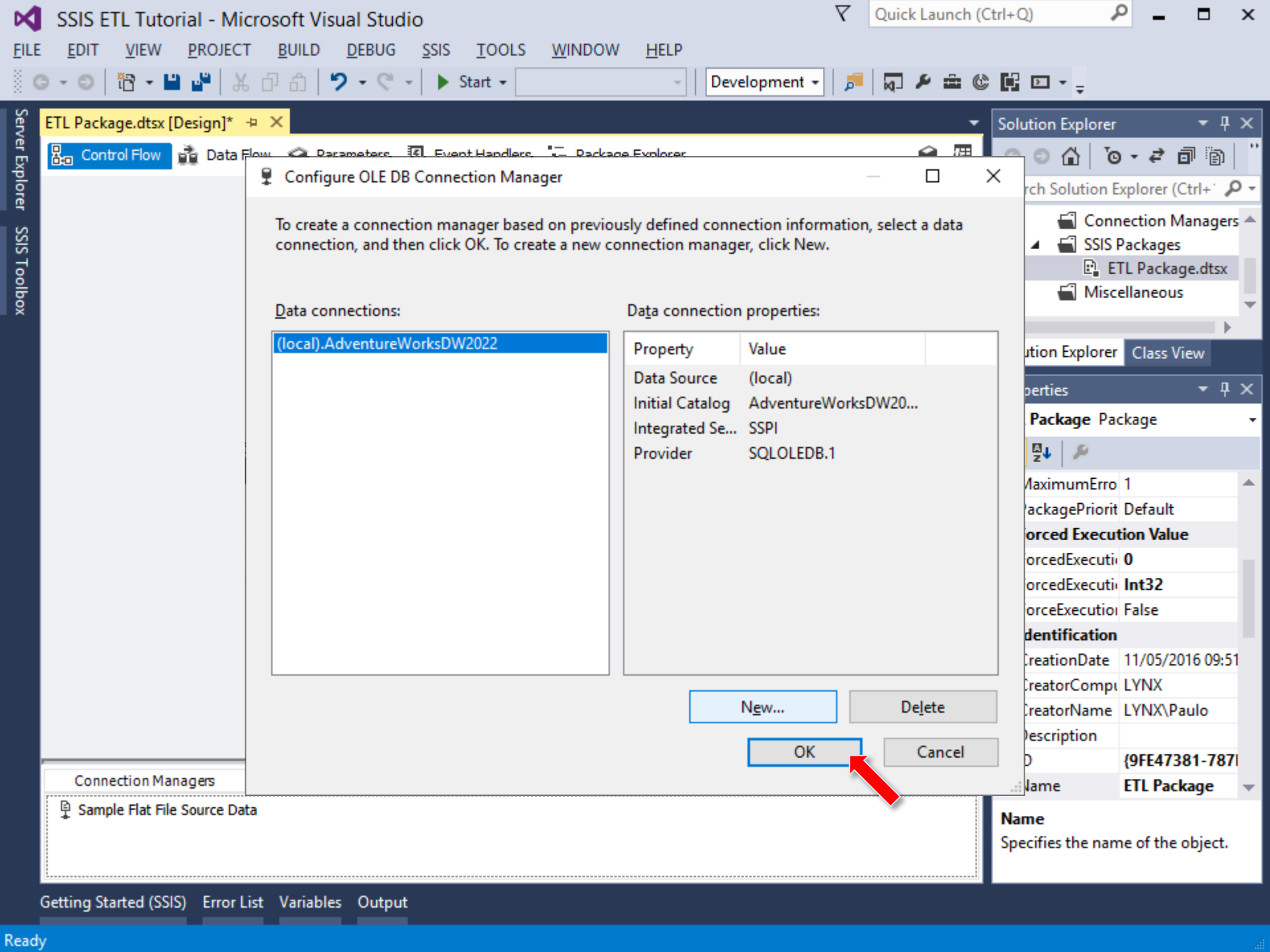
☐ Allow saving password

Initial catalog:
AdventureWorksDW2022

Test Connection

OK Cancel Help

We need to provide the server name (in this case, localhost) and the database name to which we want to connect (*AdventureWorksDW2022*) – to see if everything is OK we can test the connection.





Server Explorer SSIS Toolbox

SSIS Toolbox

- Favorites
 - Data Flow Task** (highlighted with a red arrow)
 - Execute SQL Task
- Common
 - Analysis Services Processing Task
 - Bulk Insert Task
 - Data Profiling Task
 - Execute Package Task
 - Execute Process Task
 - Expression Task
 - File System Task
 - FTP Task
 - Script Task
 - Send Mail Task
 - Web Service Task
 - XML Task
- Containers
 - For Loop Container
 - Foreach Loop Container
 - Sequence Container
- Other Tasks
 - Data Flow Task**
 - Moves data between sources and destinations while transforming and cleaning. Data can be moved between tables and files while efficiently processing the data in memory with transformations. This is an...
 - [Find Samples](#)

Drag a *Data Flow Task* from the *SSIS Toolbox* into the work area.

The Data Flow task encapsulates the data flow engine that moves data between sources and destinations, and provides the functionality for transforming, cleaning, and modifying data as it is moved. The Data Flow task is where most of the work of an extract, transform, and load (ETL) process occurs.

Event Handlers

Pack

WorksDW2012

Solution Explorer Class View

Properties

ETL Package Package

MaximumError 1

PackagePriority Default

☒ **Forced Execution Value**

ForcedExecution 0

ForcedExecution Int32

ForceExecution False

☒ **Identification**

CreationDate 11/05/2016 09:51

CreatorCompany LYNX

CreatorName LYNX\Paulo

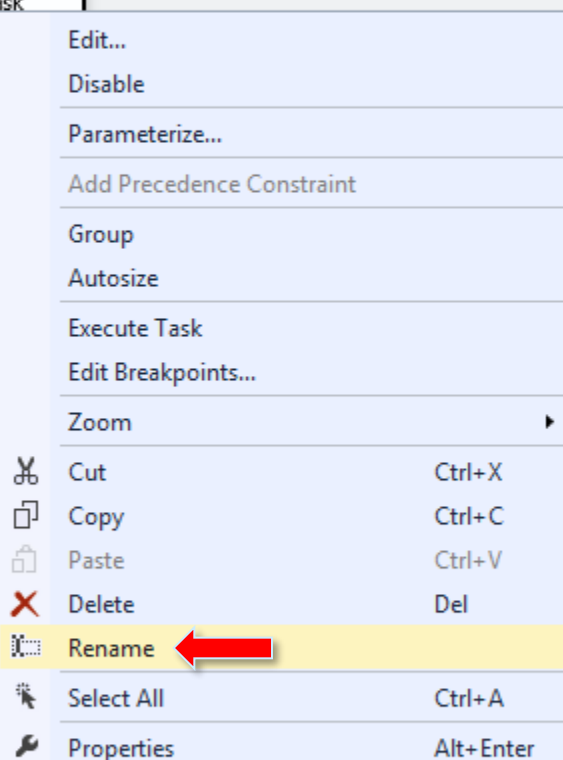
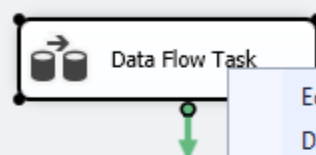
Description

ID {9FE47381-7871-4...

Name ETL Package

Name

Specifies the name of the object.

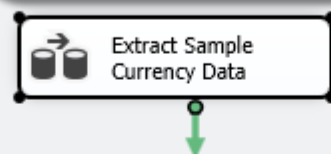


Let's change the name of the data flow task to *Extract Sample Currency Data* – just right click on the component and select *Rename*.

MaximumError	1
Forced Execution Value	
ForcedExecution	0
ForcedExecutionInt32	Int32
ForceExecution	False
Identification	
Description	Data Flow Task
ID	{62D6E2FA-AF0F
Name	Data Flow Task
PackagePath	\Package\Data F

Name
Specifies the name of the object.

The package created in this Integration Services tutorial interpret the values of locale-sensitive data. If the computer is not configured to use the regional option English (United States), we need to set additional properties in the package. Be sure that the component's *LocaleID* property is set to *English (United States)*.



Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer

Class View

Properties

Extract Sample Currency Data Task



DefaultBufferSize 10485760

EngineThreads 10

ExecValueVariable <none>

Expressions

ForceExecutionResult None

HasExpressions False

LocaleID English (United States)

LoggingMode UseParentSetting

RunInOptimizedMode True

Transactions

[Show Editor](#); [Edit Breakpoints](#)

LocaleID

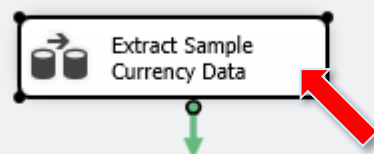
Connection Managers

Sample Flat File Source Data (local).AdventureWorksDW2022

Double click the component to edit the data flow or click on the *Data Flow* tab.

ETL Package.dtsx [Design]*

Control Flow Data Flow Task Event Hand... Package Ex...



Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer

Class View

Properties

Extract Sample Currency Data Task

MaximumErrorCount

1

Forced Execution Value

ForcedExecutionValue

0

ForcedExecutionValueT

Int32

ForceExecutionValue

False

Identification

Description

Data Flow Task

ID

{62D6E2FA-AF0F-47E2-B4B8

Name

Extract Sample Currency D

PackagePath

\Package\Extract Sample Cu

[Show Editor](#); [Edit Breakpoints](#)

Name

Specifies the name of the object.

Connection Managers

Sample Flat File Source Data (local).AdventureWorksDW2022

SSIS Toolbox

- Export Column
- Fuzzy Grouping
- Fuzzy Lookup
- Import Column
- Percentage Sampling
- Pivot
- Row Sampling
- Term Extraction
- Term Lookup
- Unpivot
- Other Sources
 - ADO NET Source
 - CDC Source
 - Excel Source
 - Flat File Source**
 - ODBC Source
 - OLE DB Source
 - Raw File Source
 - XML Source
- Other Destinations
 - ADO NET Destination

Flat File Source

Reads a text file. Specify fixed widths for data columns or use delimiters to identify columns and rows. Use both techniques for files having a mixed format.

[Find Samples](#)

Drag a *Flat File Source* from the *SSIS Toolbox* into the work area.

A *Flat File Source* is a data flow component that uses metadata defined by a *Flat File Connection Manager* to specify the format and structure of the data to be extracted from the flat file by a transform process. The *Flat File Source* can be configured to extract data from a single flat file by using the file format definition provided by the Flat File connection manager.

Properties

Extract Sample Currency Data Task

MaximumErrorCount	1
<input checked="" type="checkbox"/> Forced Execution Value	
ForcedExecutionValue	0
ForcedExecutionValueType	Int32
ForceExecutionValue	False
<input checked="" type="checkbox"/> Identification	
Description	Data Flow Task
ID	{62D6E2FA-AF0F-47E2-B4B8}
Name	Extract Sample Currency Data
PackagePath	\Package\Extract Sample Cu

[Edit Breakpoints](#)

Name

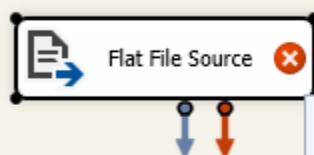
Specifies the name of the object.

Let's rename the component as
Extract Sample Currency Data.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Hand... Package Ex...

Data Flow Task: Extract Sample Currency Data



- Edit...
- Show Advanced Editor...
- Group
- Autosize
- Add Path
- Zoom
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Delete Del
- Rename**
- Properties Alt+Enter

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Flat File Source Data Flow Component

Common Properties

ComponentClassID	{C4D48377-EFD6-4C95-9A0E-...}
ContactInfo	Flat File Source;Microsoft Co
Description	Flat File Source
ID	1
IdentificationString	Flat File Source
IsDefaultLocale	True
LocaleID	English (United States)
Name	Flat File Source
PipelineVersion	0

[Show Editor](#); [Show Advanced Editor](#)**Name**

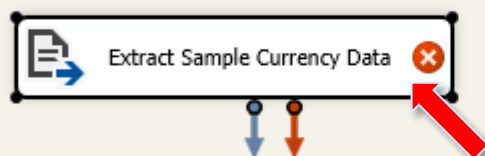
Specifies the name of the component.

Double click the component to edit/configure it.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Hand... Package Ex...

Data Flow Task: Extract Sample Currency Data



Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Extract Sample Currency Data Data Flow Component

Common Properties

ComponentClassID	{C4D48377-EFD6-4C95-9A0E-...}
ContactInfo	Flat File Source;Microsoft Co
Description	Flat File Source
ID	1
IdentificationString	Extract Sample Currency Data
IsDefaultLocale	True
LocaleID	English (United States)
Name	Extract Sample Currency Data
PipelineVersion	0

[Show Editor](#); [Show Advanced Editor](#)**Name**

Specifies the name of the component.

As we only have one flat file connection manager, it is already correctly selected.

Configure the properties used to connect to and obtain data from a text file.

Connection Manager

Columns

Error Output

Flat file connection manager:

Sample Flat File Source Data

New...

☐ Retain null values from the source as null values in the data flow

Preview...

OK

Cancel

Help

It's possible to select just the columns that we want to use and also to rename them – we are going to use all the columns, with their default names.

Configure the properties used to connect to and obtain data

Connection Manager

Columns

Error Output

Available External C...

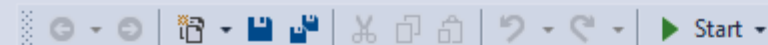
<input checked="" type="checkbox"/>	Name
<input checked="" type="checkbox"/>	AverageRate
<input checked="" type="checkbox"/>	CurrencyID
<input checked="" type="checkbox"/>	CurrencyDate
<input checked="" type="checkbox"/>	EndOfDayRate

External Column	Output Column
AverageRate	AverageRate
CurrencyID	CurrencyID
CurrencyDate	CurrencyDate
EndOfDayRate	EndOfDayRate

OK

Cancel

Help



SSIS Toolbox

Favorites

- Destination Assistant
- Source Assistant

Common

- Aggregate
- Conditional Split
- Data Conversion
- Derived Column
- Lookup**
- Merge
- Merge Join
- Multicast
- OLE DB Command
- Row Count
- Script Component
- Slowly Changing Dimension
- Sort
- Union All

Other Transforms

- Audit
- Cache Transform

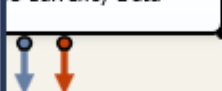
Lookup

Joins additional columns to the data flow by looking up values in a table. For example, join to the 'employee id' column the employees table to get 'hire date' and 'employee name'. We recommend...

[Find Samples](#)

Event Handlers

e Currency Data



e Source Data

Drag a *Lookup* component from the *SSIS Toolbox* into the work area.

A Lookup transformation performs a lookup by joining data in the specified input column to a column in a reference dataset. The reference dataset can be an existing table or view, a new table, or the result of an SQL statement.

- Project.params
- Connection Managers
- SSIS Packages

Solution Explorer Class View

Properties

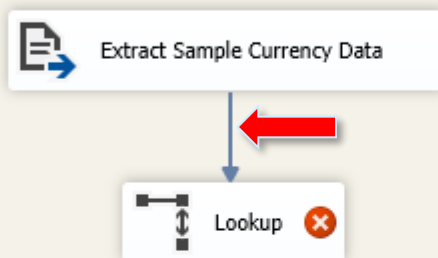
Extract Sample Currency Data Data Flow Conn

ComponentClassID	{C4D48377-EFD6-4C95-9...
ContactInfo	Flat File Source;Microso
Description	Flat File Source
ID	1
IdentificationString	Extract Sample Currency
IsDefaultLocale	False
LocaleID	English (United States)
Name	Extract Sample Curren
PipelineVersion	0
UsesDispositions	True

[Show Editor](#) [Show Advanced Editor](#)

LocaleID

Specifies the locale that the component uses to interpret locale-sensitive data such as date and ...



Drag the blue arrow (representing the data flow) from the *Extract Sample Currency Data* onto the *Lookup* component.

ForceExecutionValue	False
Identification	
Description	Data Flow Task
ID	{62D6E2FA-AF0F-47E2-E...
Name	Extract Sample Curren
PackagePath	\Package\Extract Sampl
Misc	
[Lookup].[SqlConn	
[Lookup].[SqlConn	
BLOBTempStorageF	

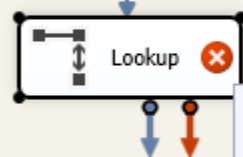
Let's change the name of the Lookup to *Lookup CurrencyKey* – just right click on the component and select *Rename*.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data

Extract Sample Currency Data



- Edit...
- Show Advanced Editor...
- Group
- Autosize
- Add Path
- Zoom
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Delete Del
- Rename**
- Properties Alt+Enter

Connection Managers

(local).AdventureWorksDW2022

Sample Flat File Source Data

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

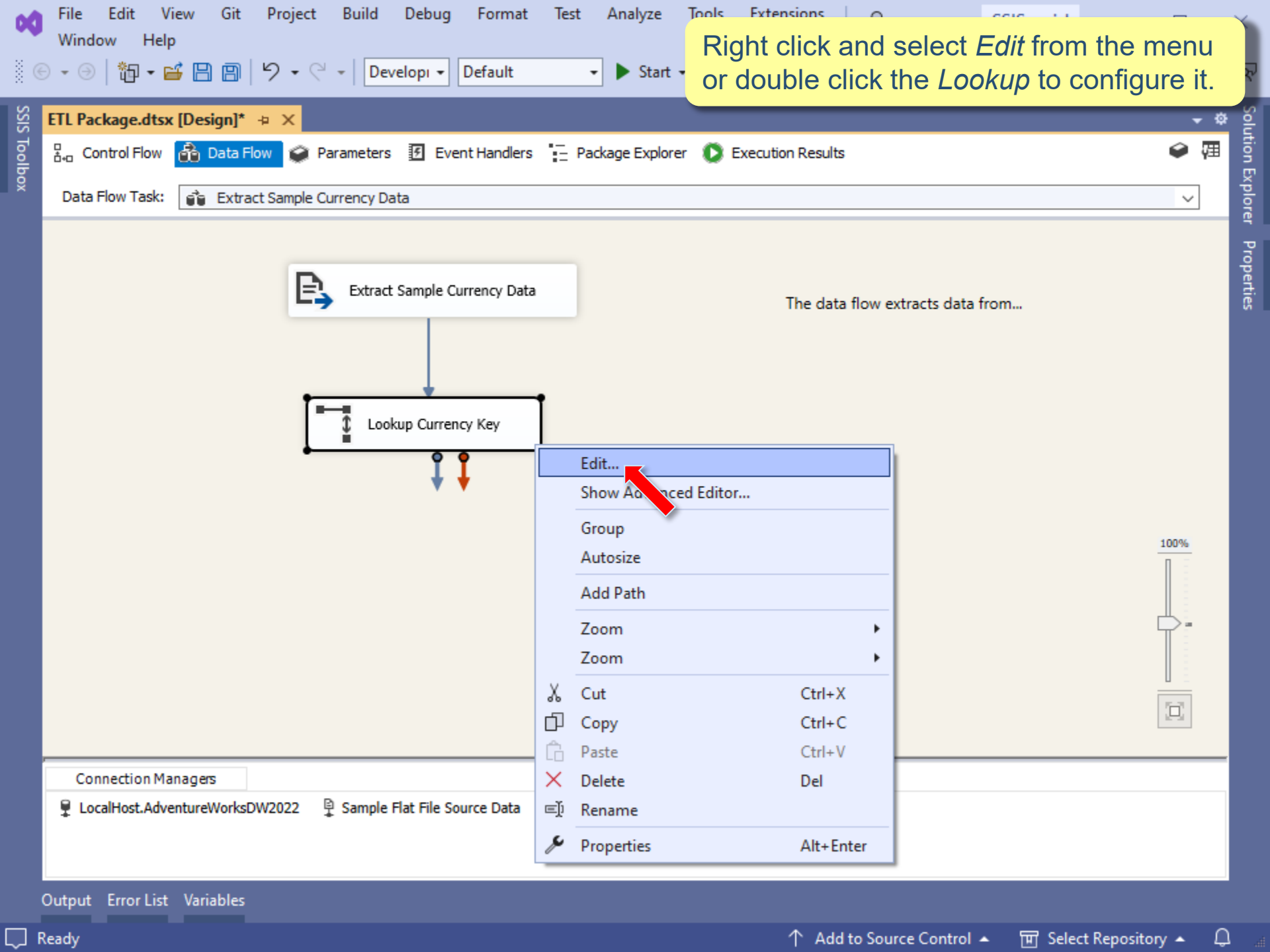
Lookup Data Flow Component

ID	26
IdentificationString	Lookup
IsDefaultLocale	True
LocaleID	English (United States)
Name	Lookup
PipelineVersion	0
UsesDispositions	True
ValidateExternalMet	True
Version	6

Custom Properties

[Show Editor](#) [Show Advanced Editor](#)**Name**

Specifies the name of the component.



As the *DimCurrency* is a short table (105 rows), all the data can be full-cached in memory.

This transform enables the performance of simple equi-joins between

General

Connection

Columns

Advanced

Error Output

Cache mode

☒ Full cache

☐ Partial cache

☐ No cache

Connection type

☐ Cache connection manager

☒ OLE DB connection manager

Specify how to handle rows with no matching entries

Fail component

OK


Cancel

Help

Lookup Transformation Editor

This transform enables the performance of simple equi-joins between the input and a

General

Connection 


Columns

Advanced

Error Output





















Specify a data source to use. You can select a table in a data source view, a table in a database connection, or the results of an SQL query.

OLE DB connection manager:

(local).AdventureWorksDW2022 

New...

☒ Use a table or a view:

	[dbo].[DimCurrency]	
	[dbo].[AdventureWorksDWBuildVersion]	
	[dbo].[DatabaseLog]	
	[dbo].[DimAccount]	
	[dbo].[DimCustomer]	
	[dbo].[DimDate]	
	[dbo].[DimDepartmentGroup]	
	[dbo].[DimEmployee]	
	[dbo].[DimGeography]	
	[dbo].[DimOrganization]	
	[dbo].[DimProduct]	
	[dbo].[DimProductCategory]	
	[dbo].[DimProductSubcategory]	
	[dbo].[DimPromotion]	
	[dbo].[DimReseller]	
	[dbo].[DimSalesReason]	
	[dbo].[DimSalesTerritory]	
	[dbo].[DimScenario]	
	[dbo].[FactAdditionalInternationalProductDescription]	

New...

Build Query...

Browse...

Parse Query

Cancel

Help

Let's select the *DimCurrency* table of the *AdventureWorksDW2022* database as the reference table.

Let's define that we want a match (join) between the values of *CurrencyID* (flat file) and *CurrencyAlternateKey* (*DimCurrency* table) – as result of the match we want to obtain the value of the *CurrencyKey* (*DimCurrency* table) – drag the *CurrencyID* field onto the *CurrencyAlternateKey* field and check the *CurrencyKey* field.

This transform enables the performance of simple

General
Connection
Columns
Advanced
Error Output

Available Input...

Name
AverageRate
CurrencyID
CurrencyDate
EndOfDayRate

Available Lookup Columns

<input type="checkbox"/>	Name	Index
<input checked="" type="checkbox"/>	CurrencyKey	
<input type="checkbox"/>	CurrencyAlternateKey	
<input type="checkbox"/>	CurrencyName	

Lookup Column	Lookup Operation	Output Alias
CurrencyKey	<add as new column>	CurrencyKey

OK

Cancel

Help

Drag another *Lookup* component from the *SSIS Toolbox* into the work area.

SSIS Toolbox

Favorites

- Destination Assistant
- Source Assistant

Common

- Aggregate
- Conditional Split
- Data Conversion
- Derived Column
- Lookup**
- Merge
- Merge Join
- Multicast
- OLE DB Command
- Row Count
- Script Component
- Slowly Changing Dimension
- Sort
- Union All

Other Transforms

- Audit
- Cache Transform

Lookup

Joins additional columns to the data flow by looking up values in a table. For example, join to the 'employee id' column the employees table to get 'hire date' and 'employee name'. We recommend...

[Find Samples](#)

Event Handlers Package Explorer

e Currency Data

Currency Key

e Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

- Project.params
- Connection Managers
- SSIS Packages

Solution Explorer Class View

Properties

Lookup Currency Key Data Flow Component

Version 6

Custom Properties

CacheType	Full
ConnectionType	OleDb
DefaultCodePage	1252
NoMatchBehavior	Treat rows with no match
NoMatchCachePercent	0
ReferenceMetadata	<referenceMetadata>
SqlCommand	select * from [dbo].[Dir
TreatDuplicateKeys	False

[Show Editor](#) [Show Advanced Editor](#)

Name

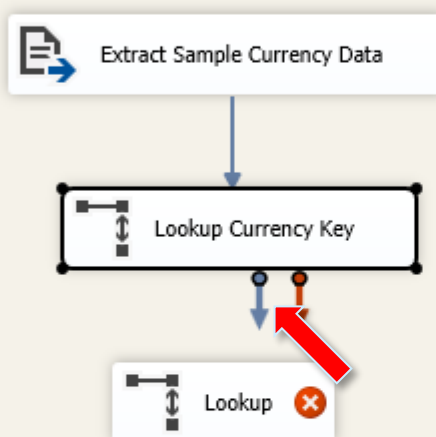
Specifies the name of the component.

Drag the blue arrow from the *Lookup Currency Key* onto the new *Lookup* component.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data



Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Lookup Currency Key Data Flow Component

Name	Lookup Currency Key
PipelineVersion	0
UsesDispositions	True
ValidateExternalMet	True
Version	6
Custom Properties	
CacheType	Full
ConnectionType	OleDb
DefaultCodePage	1252
NoMatchBehavior	Treat rows with no mat

[Show Editor](#) [Show Advanced Editor](#)**Name**

Specifies the name of the component.

We just want the records/rows in which there was a match in the Lookup of the Currency Key – we'll take care of the others later in this tutorial.

ETL Package.dtsx [Design]* X

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data

Input Output Selection

The source or the destination component contains multiple inputs or outputs. Select an input and an output to connect the components.

Output:

Lookup Match Output

Input:

Lookup Input

OK Cancel

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

ETL Package.dtsx

Class View

Currency Key Data Flow Component

Lookup Currency Key

0

True

True

6

Properties

Full

OLEDB

DefaultCodePage 1252

NoMatchBehavior Treat rows with no match

[Show Editor](#) [Show Advanced Editor](#)**Name**

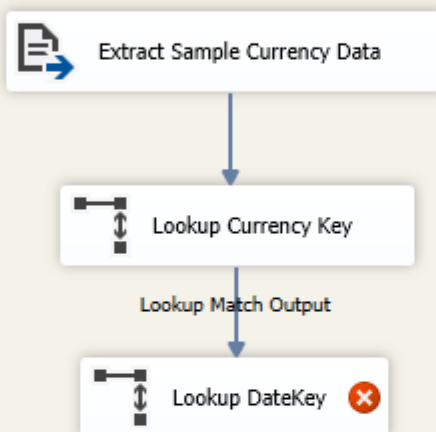
Specifies the name of the component.

Change the name of the
Lookup to *Lookup Date Key*.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data



Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

- SSIS ETL Tutorial
 - Project.params
 - Connection Managers
 - SSIS Packages
 - ETL Package.dtsx

Solution Explorer Class View

Properties

Extract Sample Currency Data Task

ForceExecutionValue False

Identification

Description	Data Flow Task
ID	{62D6E2FA-AF0F-47E2-E...
Name	Extract Sample Curren
PackagePath	\Package\Extract Sampl

Misc

[Lookup Currency K select * from [dbo].[Dir

[Lookup Currency K select * from (select * fr

[Lookup DateKey].[S

[Edit Breakpoints](#)**Name**

Specifies the name of the object.

Right click and select *Edit* from the menu or double click the *Lookup* to configure it.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data

Extract Sample Currency Data

Lookup Currency Key

Lookup Match Output

Lookup DateKey

Edit...

Show Advanced Editor...

Group

Autosize

Add Path

Zoom



Cut

Ctrl+X



Copy

Ctrl+C



Paste

Ctrl+V



Delete

Del



Rename



Properties

Alt+Enter

Connection Managers



(local).AdventureWorksDW2022



Sample Flat File

Getting Started (SSIS) Error List Variables Output

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Lookup DateKey Data Flow Component

ID	52
IdentificationString	Lookup DateKey
IsDefaultLocale	True
LocaleID	English (United States)
Name	Lookup DateKey
PipelineVersion	0
UsesDispositions	True
ValidateExternalMet	True
Version	6

Custom Properties

[Show Editor](#) [Show Advanced Editor](#)

Name

Specifies the name of the component.

As the *DimDate* table has 2191 records it will be partially cached in memory.

This transform enables the performance of simple equi-joins between the input and a

General

Connection

Columns

Advanced

Error Output

Cache mode

☐ Full cache

☒ Partial cache

☐ No cache

Connection type

☐ Cache connection manager

☒ OLE DB connection manager

Specify how to handle rows with no matching entries

Fail component

OK


Cancel

Help

Let's select the *DimDate* table of the *AdventureWorksDW2022* database as the reference table.

This transform enables the performance of simple equi-joins between the input and a reference table.

General

Connection 


Columns

Advanced


Error Output

Specify a data source to use. You can select a table in a data source view, a table in a database connection, or the results of an SQL query.




















OLE DB connection manager:

(local).AdventureWorksDW2022 

New...

☒ Use a table or a view: [dbo].[AdventureWorksDWBuildVersion]

New...

 [dbo].[AdventureWorksDWBuildVersion] [dbo].[DatabaseLog] [dbo].[DimAccount] [dbo].[DimCurrency] [dbo].[DimCustomer] [dbo].[DimDate]  [dbo].[DimDepartmentGroup] [dbo].[DimEmployee] [dbo].[DimGeography] [dbo].[DimOrganization] [dbo].[DimProduct] [dbo].[DimProductCategory] [dbo].[DimProductSubcategory] [dbo].[DimPromotion] [dbo].[DimReseller] [dbo].[DimSalesReason] [dbo].[DimSalesTerritory] [dbo].[DimScenario] [dbo].[FactAdditionalInternationalProductDescription]

Build Query...

Browse...

Parse Query

Cancel

Help

Let's define that we want a match between the values of *CurrencyDate* (flat file) and *FullDateAlternateKey* (*DimDate* table) – as result of the match we want to obtain the value of the *DateKey* (*DimDate* table) – drag the *CurrencyDate* field onto the *FullDateAlternateKey* field and check the *DateKey* field.

General
Connection
Columns
Advanced
Error Output

Available Input...

Name
AverageRate
CurrencyID
CurrencyDate
EndOfDayRate
CurrencyKey

<input checked="" type="checkbox"/>	DateKey
<input type="checkbox"/>	FullDateAlternateKey
<input type="checkbox"/>	DayNumberOfWeek
<input type="checkbox"/>	EnglishDayNameOfWeek
<input type="checkbox"/>	SpanishDayNameOfWeek
<input type="checkbox"/>	FrenchDayNameOfWeek
<input type="checkbox"/>	DayNumberOfMonth
<input type="checkbox"/>	DayNumberOfYear
<input type="checkbox"/>	WeekNumberOfYear

Lookup Column

DateKey

Lookup Operation

<add as new column>

Output Alias

DateKey

OK

Cancel

Help

SSIS Toolbox

- CDC Source
- Excel Source
- Flat File Source
- ODBC Source
- OLE DB Source
- Raw File Source
- XML Source
- Other Destinations
 - ADO NET Destination
 - Data Mining Model Training
 - DataReader Destination
 - Dimension Processing
 - Excel Destination
 - Flat File Destination
 - ODBC Destination
 - OLE DB Destination**
 - Partition Processing
 - Raw File Destination
 - Recordset Destination
 - SQL Server Compact Destination
 - SQL Server Destination

OLE DB Destination

Loads data into an OLE DB-compliant relational database, such as SQL Server. Many types of databases are OLE DB-compliant. With minor reconfiguration, this destination can be used before...

[Find Samples](#)

Event Hand

e Currency Data

Currency Key

atch Output

p DateKey

100%

e Source Data

The package now can extract data from the flat file source and transform that data into a format that is compatible with the destination. The next task is to actually load the transformed data into the destination. To load the data, we must add an *OLE DB Destination* to the data flow.

Drag an *OLE DB Destination* from the *SSIS Toolbox* into the work area.

SSIS Packages

Solution Explorer Class View

Properties

Lookup DateKey Data Flow Component

DefaultCodePage	1252
MaxMemoryUsage	25
MaxMemoryUsage6	25
NoMatchBehavior	Treat rows with no mate
NoMatchCachePerc	0
ParameterMap	#18;
ReferenceMetadata	<referenceMetadata> <1
SqlCommand	select * from [dbo].[Dir
SqlCommandParam	select * from (select * fr
TreatDuplicateKeys	False

[Show Editor](#) [Show Advanced Editor](#)

LocaleID

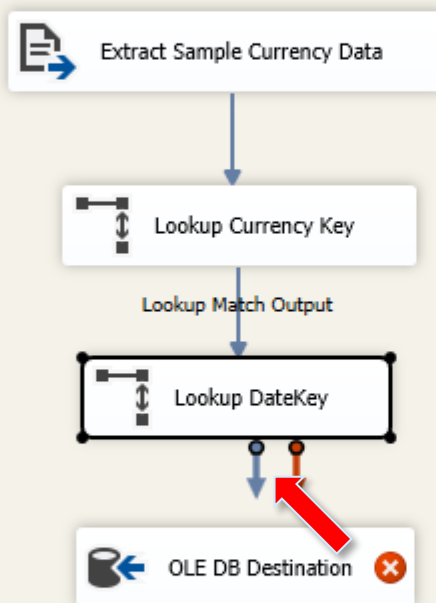
Specifies the locale that the component uses to interpret locale-sensitive data such as date and ...

Drag the blue arrow from the *Lookup Currency Key* onto the *OLE DB Destination*.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data



A connection manager has not been assigned to the OLE DB Destination.Connections[OleDbConnection].

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Lookup DateKey Data Flow Component

ID	52
IdentificationString	Lookup DateKey
IsDefaultLocale	True
LocaleID	English (United States)
Name	Lookup DateKey
PipelineVersion	0
UsesDispositions	True
ValidateExternalMet	True

Custom Properties

[Show Editor](#) [Show Advanced Editor](#)

LocaleID

Specifies the locale that the component uses to interpret locale-sensitive data such as date and ...

Once again, we just want the records/rows in which there was a match in the Lookup of the Date Key.

Input Output Selection

The source or the destination component contains multiple inputs or outputs. Select an input and an output to connect the components.

Output:

Lookup Match Output

Input:

OLE DB Destination Input

OK Cancel

A connection manager has not been assigned to the OLE DB Destination.Connections[OleDbConnection].

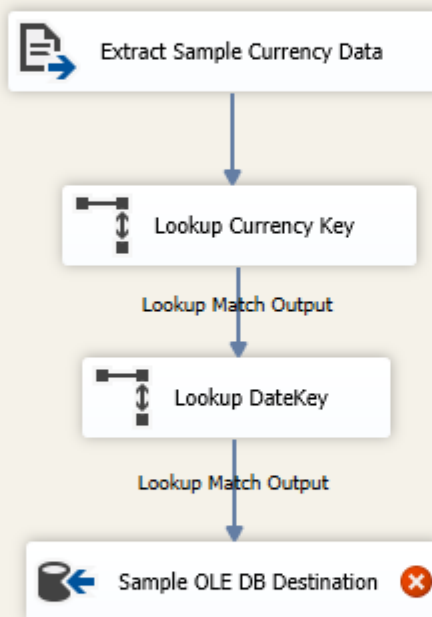
52
onString Lookup DateKey
cale True
English (United States)
Lookup DateKey
ision 0
itions True
ernalMet True

Change the name of the *OLE DB Destination* to *Sample OLE DB Destination* and edit the component to configure it.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data



Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Getting Started (SSIS) Error List Variables Output

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Extract Sample Currency Data Task

ForceExecutionValu False

Identification

Description	Data Flow Task
ID	{62D6E2FA-AF0F-47E2-E
Name	Extract Sample Curren
PackagePath	\Package\Extract Sampl

Misc

[Lookup Currency K select * from [dbo].[Dir
[Lookup Currency K select * from (select * fr
[Lookup DateKey].[select * from [dbo].[Dir

[Edit Breakpoints](#)

Name

Specifies the name of the object.

OLE DB Destination Editor

Configure the properties used to insert data into a relational database using an OLE DB connection manager.

Connection Manager

Mappings

Error Output

Specify an OLE DB connection manager, a data source, or a data source view, and select the data access mode. If using the SQL command access mode, specify the SQL command either by typing the query or by using Query Builder. For fast-load data access, set the table update options.

OLE DB connection manager:

(local).AdventureWorksDW2022

New...

Data access mode:

Table or view - fast load

Name of the table or the view:

[dbo].[FactCurrencyRate]
[dbo].[DimOrganization]
[dbo].[DimProduct]
[dbo].[DimProductCategory]
[dbo].[DimProductSubcategory]
[dbo].[DimPromotion]
[dbo].[DimReseller]
[dbo].[DimSalesReason]
[dbo].[DimSalesTerritory]
[dbo].[DimScenario]
[dbo].[FactAdditionalInternationalProductDescription]
[dbo].[FactCallCenter]
[dbo].[FactCurrencyRate]
[dbo].[FactFinance]
[dbo].[FactInternetSales]
[dbo].[FactInternetSalesReason]
[dbo].[FactProductInventory]
[dbo].[FactResellerSales]

New...

Help

Let's select the *FactCurrencyRate* table of the *AdventureWorksDW2022* database as the destination table.

Connections

localhost...

Configure the properties used to insert data into a relational database using an OLE DB connection manager.

Connection Manager

Mappings

Error Output

Specify an OLE DB connection manager, a data source, or a data source view, and select the data access mode. If using the SQL command access mode, specify the SQL command either by typing the query or by using Query Builder. For fast-load data access, set the table update options.

OLE DB connection manager:

(local).AdventureWorksDW2022

New...

Data access mode:

Table or view - fast load

Name of the table or the view:

[dbo].[FactCurrencyRate]

New...

☐ Keep identity

☒ Table lock

☐ Keep nulls

☒ Check constraints

Rows per batch:

Maximum insert commit size:

2147483647

View Existing

OK

Cancel

Help

Click **New** to create a new table (*NewFactCurrencyRate*) based on the *FactCurrencyRate* table schema.

Configure the properties used to insert data into a relational data

Change the table name to *NewFactCurrencyRate*.
If an error occurs it's because the table already
exists in the database – use another name (e.g.,
NewFactCurrencyRate2).

Connection Manager

Mappings

Error Output

Specify an OLE DB connection manager, the SQL command access mode, specify fast-load data access, set the table update options.

Create Table

```
CREATE TABLE [NewFactCurrencyRate] (  
    [AverageRate] real,  
    [CurrencyID] nvarchar(3),  
    [CurrencyDate] date,  
    [EndOfDayRate] real,  
    [CurrencyKey] int,  
    [DateKey] int  
)
```

OK Cancel

View Existing Data...



Map the columns on the Mappings page.

OK

Cancel

Help

Check if all the input columns are mapped with the destination table columns.

Configure the properties used to insert data into a relational database using an OLE DB

Connection Manager

Mappings

Error Output

Available Inpu...

Name
AverageRate
CurrencyID
CurrencyDate
EndOfDayRate
CurrencyKey
DateKey

Available Dest...

Name
AverageRate
CurrencyID
CurrencyDate
EndOfDayRate
CurrencyKey
DateKey

Input Column	Destination Column
AverageRate	AverageRate
CurrencyID	CurrencyID
CurrencyDate	CurrencyDate
EndOfDayRate	EndOfDayRate
CurrencyKey	CurrencyKey
DateKey	DateKey

OK

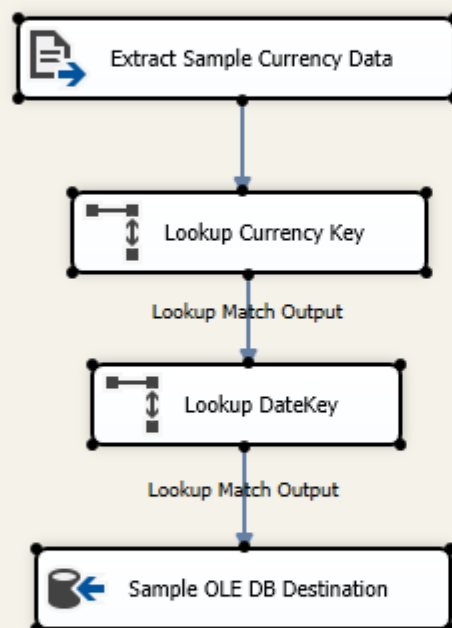
Cancel

Help

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers

Data Flow Task: Extract Sample Currency Data



SSIS provides tools that make it easy and quick to format the package layout. The formatting features include the ability to make shapes the same size, align shapes, and manipulate the horizontal and vertical spacing between shapes. Drag a rectangle around all the components in order to select them.

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

A Z

Common Properties

Description

ID

Name

Connection Managers

(local).AdventureWorksDW2022

Sample Flat File Source Data

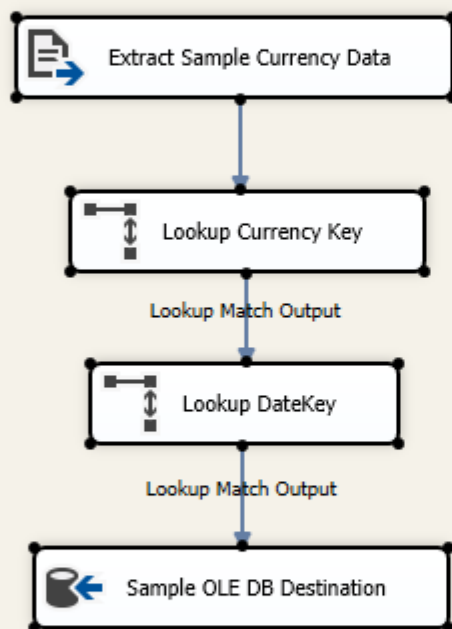
Getting Started (SSIS) Error List Variables Output

This makes all components of the same size.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters

Data Flow Task: Extract Sample Currency Data



Connection Managers

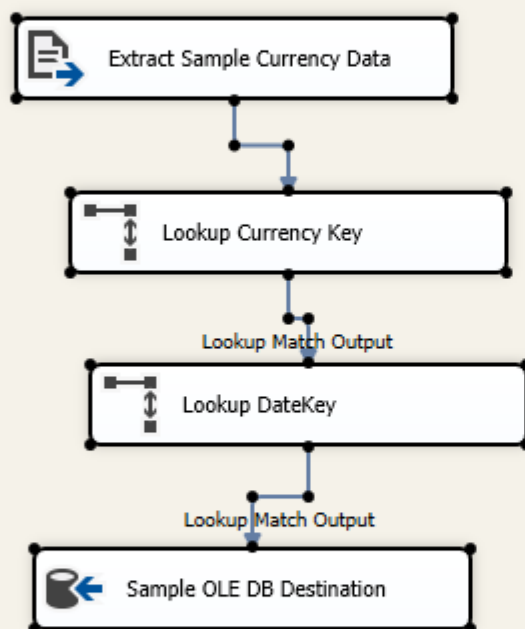
(local).AdventureWorksDW2022 Sample Flat File Source Data

This makes all components to be left aligned.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters

Data Flow Task: Extract Sample Currency Data



Autosize

Auto Layout

Align

Make Same Size

Horizontal Spacing

Vertical Spacing

Lefts

Centers

Rights

Tops

Middles

Bottoms

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer

Class View

Properties

Common Properties

Description

ID

Name

Common Properties

Connection Managers

(local).AdventureWorksDW2022

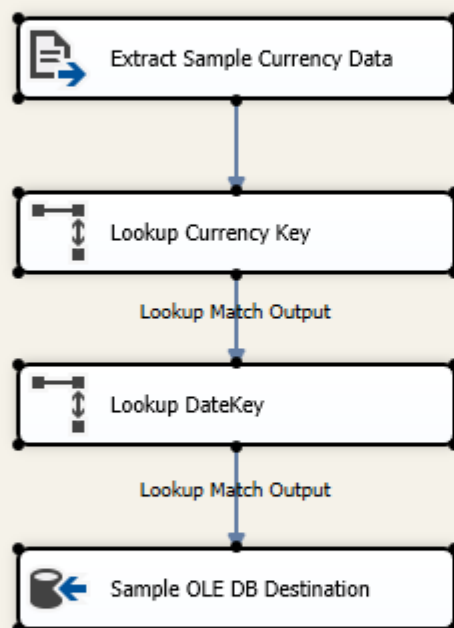
Sample Flat File Source Data

Components are now of equal size and are perfectly aligned.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data



Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

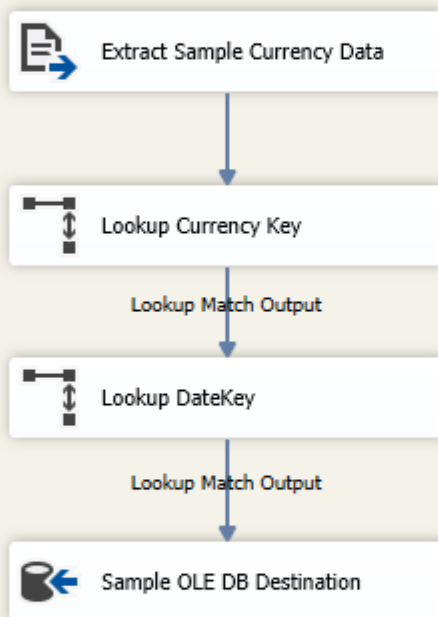
Common Properties

Description

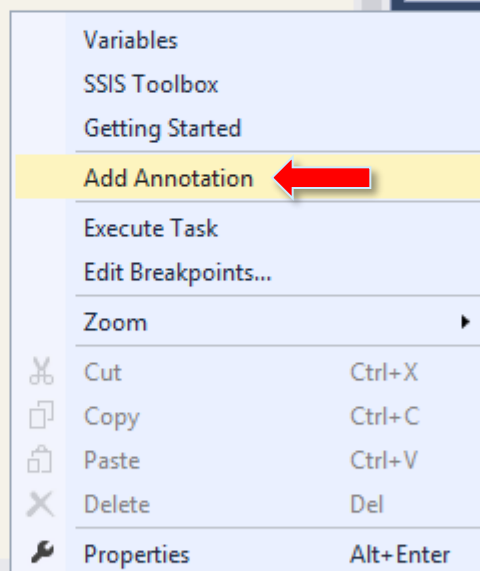
ID

Name

Common Properties



Another way to improve the understanding of package functionality is to add annotations that describe the package functionality. To add an annotation right-click an empty area of the work area and select *Add Annotation*.



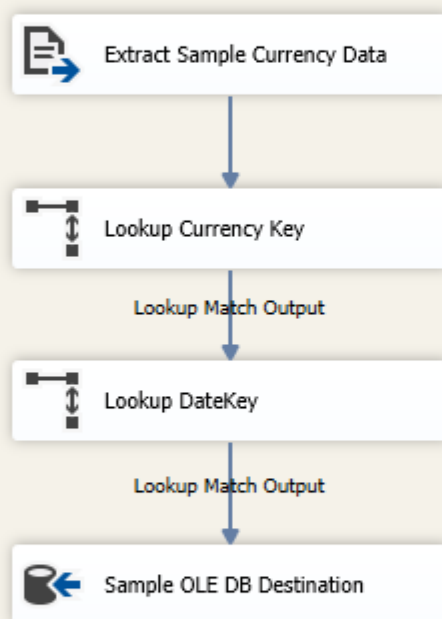
Solution 'SSIS ETL Tutorial' (1 project)	
SSIS ETL Tutorial	
Project.params	
Connection Managers	
SSIS Packages	
ETL Package.dtsx	
Sample Currency Data Task	
MaximumErrorCount	1
Execution Value	
ExecutionValue	0
ExecutionValue	Int32
ExecutionValue	False
Notification	
Description	Data Flow Task
Id	{62D6E2FA-AF0F-47E2-E...
Name	Extract Sample Curren
PackagePath	\Package\Extract Sampl
Breakpoints	

The annotation explains the purpose of this data flow.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Handlers Package Explorer

Data Flow Task: Extract Sample Currency Data



The data flow extracts data from a file, looks up values in the CurrencyKey column in the DimCurrency table and the DateKey column in the DimDate table, and writes the data to the FactCurrencyRate table.

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Extract Sample Currency Data Task

MaximumErrorCour 1

Forced Execution Value

ForcedExecutionVal 0

ForcedExecutionVal Int32

ForceExecutionValu False

Identification

Description Data Flow Task

ID {62D6E2FA-AF0F-47E2-E

Name Extract Sample Curren

PackagePath \Package\Extract Sampl

[Edit Breakpoints](#)

Name

Specifies the name of the object.

Use the *Start Debugging* option from the *Debug* menu to execute the package.

ETL Package.dtsx [Design]

Control Flow Data Flow

Data Flow Task: Extract Sample Curren



Lookup Match Output

Lookup DateKey

Lookup Match Output

Sample OLE DB Destination

data from a
file, looks up values in the CurrencyK
column in the DimCurrency table and
the DateKey column in the DimDate
table, and writes the data to the
FactCurrencyRate table.

Connection Managers

(local).AdventureWorksDW2022

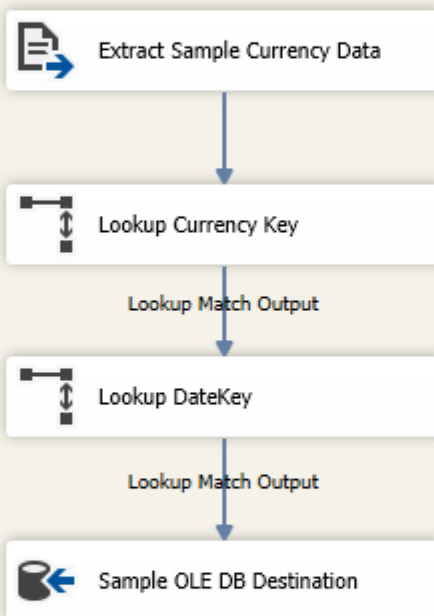
Sample Flat File Source Data

Another option is to click on the *Start* button in the toolbox.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Handlers Package Exp... Execution R...

Data Flow Task: Extract Sample Currency Data



The data flow extracts data from a file, looks up values in the CurrencyKey column in the DimCurrency table and the DateKey column in the DimDate table, and writes the data to the FactCurrencyRate table.

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Extract Sample Currency Data Task

MaximumErrorCount 1

Forced Execution Value

ForcedExecutionValue 0

ForcedExecutionValue Int32

ForceExecutionValue False

Identification

Description Data Flow Task

ID {62D6E2FA-AF0F-47E2-E

Name Extract Sample Curren

PackagePath \Package\Extract Sampl

[Edit Breakpoints](#)

Name

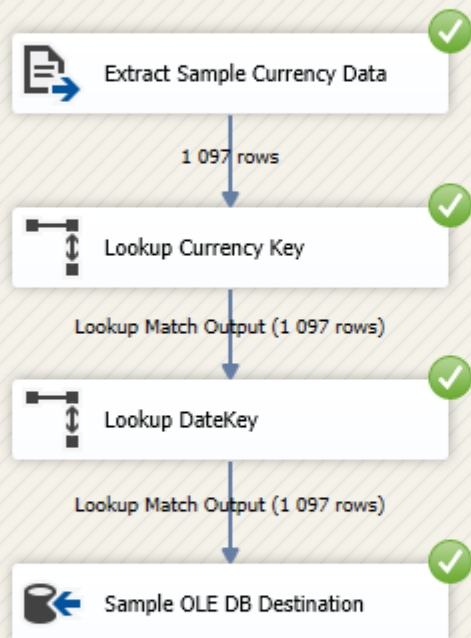
Specifies the name of the object.

The image shows that all components were executed successfully and 1097 records/rows were inserted into the destination table.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Handlers Package Explorer Progress

Data Flow Task: Extract Sample Currency Data



The data flow extracts data from a file, looks up values in the CurrencyKey column in the DimCurrency table and the DateKey column in the DimDate table, and writes the data to the FactCurrencyRate table.

Connection Managers

(local)..AdventureWorksDW2022 Sample Flat File Source Data

Package execution completed with success. Click here to switch to design mode, or select Stop Debugging from the Debug menu.

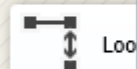
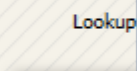
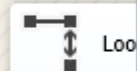
Autos Locals Watch 1 Call Stack Breakpoints Command Window Immediate Window Output

To stop execution use *Stop Debugging* from the Debug menu.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters

Data Flow Task: Extract Sample Curren



Lookup Match Output (1 097 rows)



Sample OLE DB Destination

Connection Managers

(local)..AdventureWorksDW2022 ! Sample Flat File Source Data

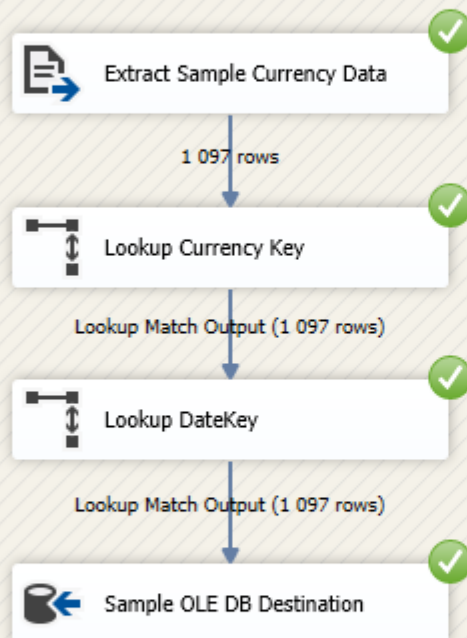
Package execution completed with success. Click here to switch to design mode, or select Stop Debugging from the Debug menu.

Another option is to click on the *Stop* button in the toolbox.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Handlers Package Explorer Progress

Data Flow Task: Extract Sample Currency Data



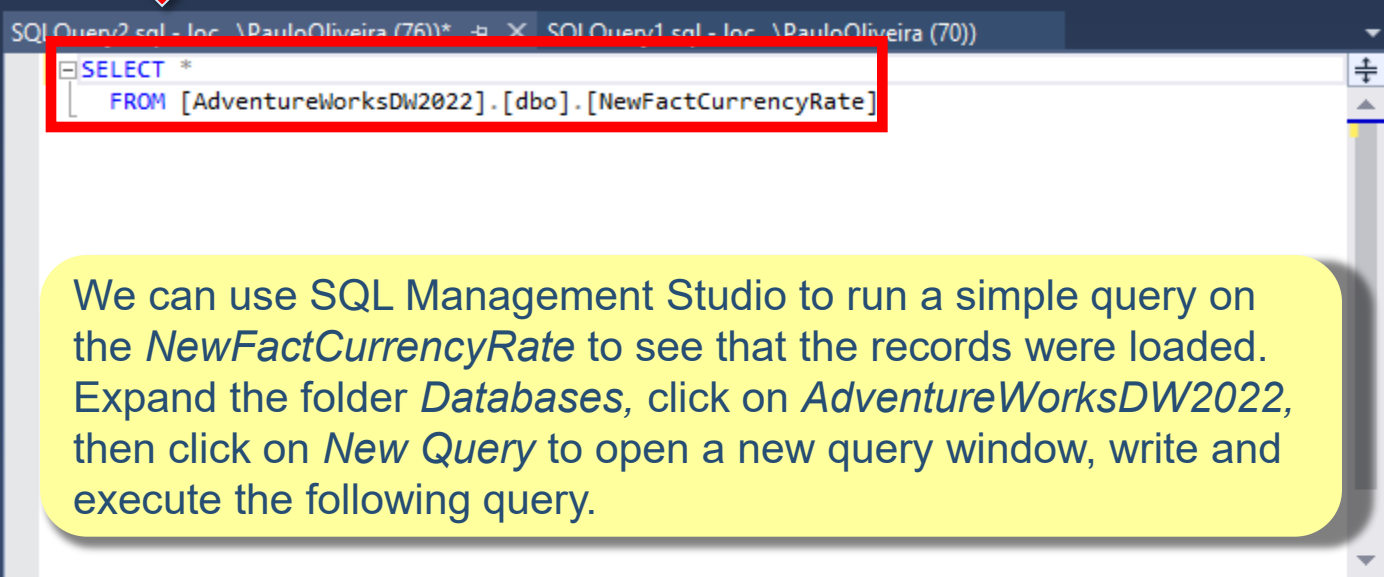
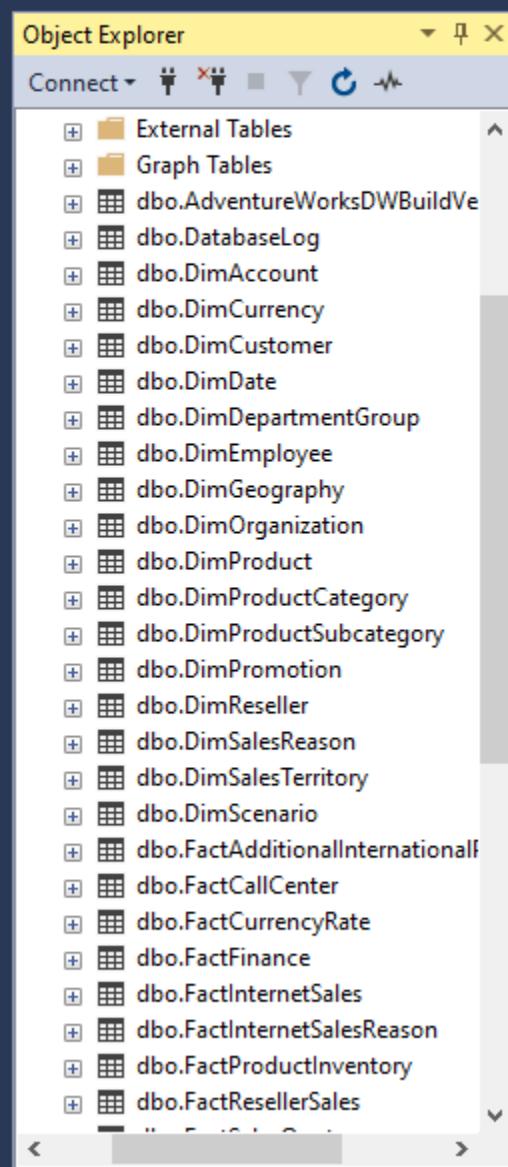
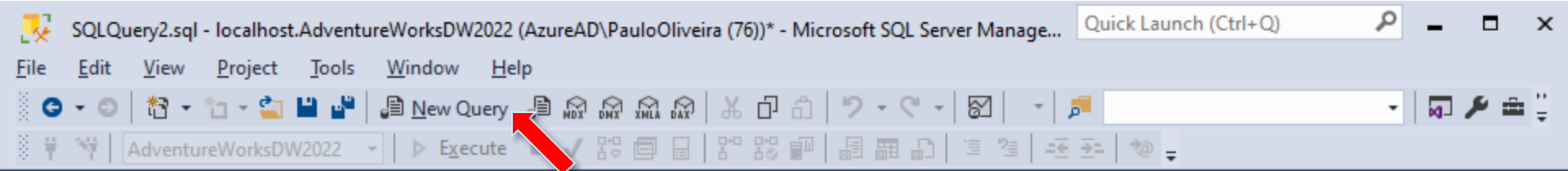
The data flow extracts data from a file, looks up values in the CurrencyKey column in the DimCurrency table and the DateKey column in the DimDate table, and writes the data to the FactCurrencyRate table.

Connection Managers

(local)..AdventureWorksDW2022 Sample Flat File Source Data

Package execution completed with success. [Click here to switch to design mode, or select Stop Debugging from the Debug menu.](#)

Autos Locals Watch 1 Call Stack Breakpoints Command Window Immediate Window Output



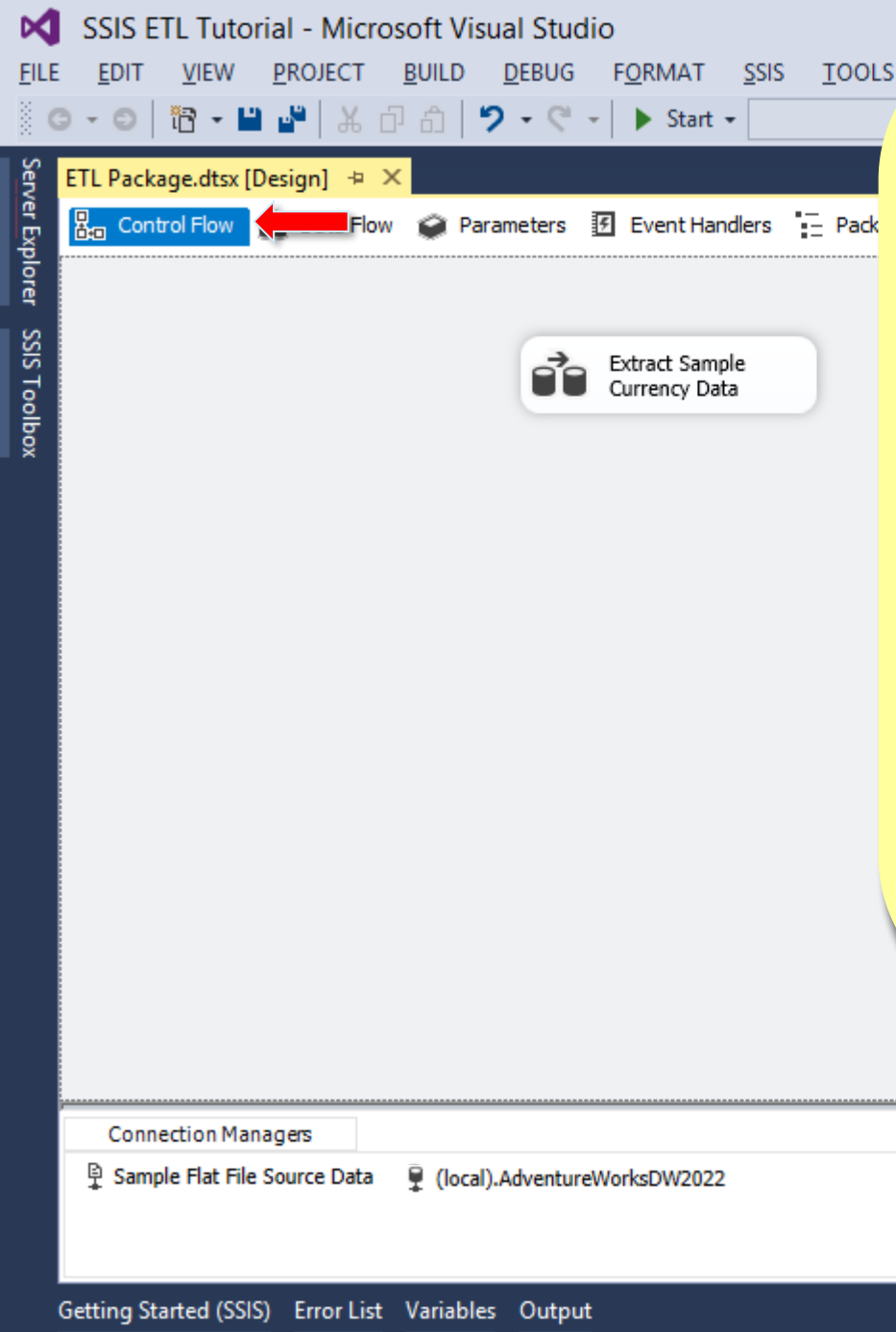
We can use SQL Management Studio to run a simple query on the *NewFactCurrencyRate* to see that the records were loaded. Expand the folder *Databases*, click on *AdventureWorksDW2022*, then click on *New Query* to open a new query window, write and execute the following query.

100 %

Results Messages

	AverageRage	CurrencyID	CurrencyDate	EndOfDayRate	CurrencyKey	DateKey
1	1	USD	2005-01-01	0.9998	100	20050101
2	1	USD	2005-01-02	1.000901	100	20050102
3	1	USD	2005-01-03	0.9996002	100	20050103
4	1	USD	2005-01-04	1	100	20050104
5	1	USD	2005-01-05	0.9996002	100	20050105
6	1	USD	2005-01-06	1.0005	100	20050106
7	1	USD	2005-01-07	0.9995003	100	20050107
8	1	USD	2005-01-08	1.0002	100	20050108
9	1	USD	2005-01-09	0.9992006	100	20050109
10	1	USD	2005-01-10	1.0002	100	20050110
11	1	USD	2005-01-11	0.9996002	100	20050111

Query executed suc... | localhost (16.0 RTM) | AzureAD\PauloOliveira ... | AdventureWorksDW2022 | 00:00:00 | 1,097 rows



Until now we created a package that extracted data from a single flat file source, transformed the data using Lookup transformations, and finally loaded the data into the destination table of the *AdventureWorksDW2022* sample database. However, it is rare for an ETL process to use a single flat file. A typical ETL process would extract data from multiple flat file sources. Extracting data from multiple sources requires an iterative control flow. Next, we will modify the simple ETL package previously created to take advantage of the Foreach Loop container. We will also set user-defined package variables to enable the package to iterate through all the flat files in a folder. Let's start by changing to *Control Flow* design view.

CreatorName	LYNX\Paulo
Description	
ID	{9FE47381-787B-4CF2
Name	ETL Package

Name

Specifies the name of the object.

Drag a *Foreach Loop Container* from the *SSIS Toolbox* into the work area.

SSIS Toolbox

Favorites

- Data Flow Task
- Execute SQL Task

Common

- Analysis Services Processing Task
- Bulk Insert Task
- Data Profiling Task
- Execute Package Task
- Execute Process Task
- Expression Task
- File System Task
- FTP Task
- Script Task
- Send Mail Task
- Web Service Task
- XML Task

Containers

- For Loop Container
- Foreach Loop Container**
- Sequence Container

Other Tasks

Foreach Loop Container

Repeats tasks in a package. For example, load each file in a directory or send an e-mail to each address in a recordset. Looping is controlled by set iterators, similar to a Foreach loop in programming.

[Find Samples](#)

Event Handlers Package Exp... Execution R...

Extract Sample
Currency Data

WorksDW2012

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

- Project.params
- Connection Managers
- SSIS Packages

Solution Explorer Class View

Properties

ETL Package Package

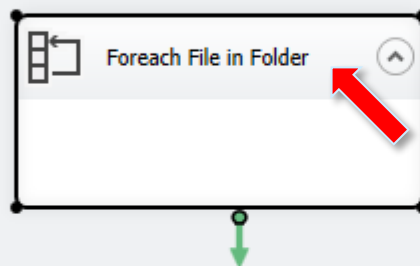
MaximumErrorCour	1
PackagePriorityClas	Default
Forced Execution Value	
ForcedExecutionVal	0
ForcedExecutionVal	Int32
ForceExecutionValu	False
Identification	
CreationDate	11/05/2016 09:51
CreatorComputerNi	LYNX
CreatorName	LYNX\Paulo
Description	
ID	{9FE47381-787B-4CF2
Name	ETL Package

Name

Specifies the name of the object.

Rename the component to
Foreach File in Folder.

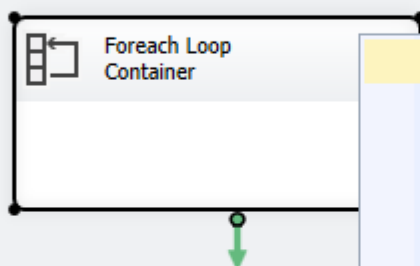
Extract Sample
Currency Data



Right click and select *Edit* from the menu or double click the component to configure it.

ETL Package.dtsx [Design]* X

Control Flow Data Flow Parameters Event Handlers Package Exp... Execution R...

Extract Sample
Currency Data

Edit...

Disable

Parameterize...

Add Annotation

Add Precedence Constraint

Group

Autosize

Collapse

Execute Container

Edit Breakpoints...

Zoom



Cut

Ctrl+X



Copy

Ctrl+C



Paste

Ctrl+V



Delete

Del



Rename



Select All

Ctrl+A



Properties

Alt+Enter

Connection Managers

Sample Flat File Source Data (local).AdventureWorksDW2022

Getting Started (SSIS) Error List Variables Output



The Foreach Loop con

General

Collection

Variable Mappings

Expressions

Foreach Loop Editor

Enumerator

Foreach File Enumerator

Expressions

Enumerator

Specifies the enumerator type.

Enumerator configuration

Folder:

C:\Temp\Tutorial 1\Data

Files:

Currency_*.txt

Retrieve file name

☐ Name and extension ☒ Fully qualified ☐ Name only☐ Traverse subfolders

OK

Cancel

Help

In the *Collection* page, specify the kind of enumerator, the folder and the mask for the files in which we want to iterate – all the files that we want to load are stored into the exercise's *Data* folder, start with "Currency_" and end with a "txt" extension.

General
Collection
Variable Mappings
Expressions

Select variables to map to the collection

Variable	Index
<New Variable...>	
<New Variable...>	

We will map the enumerated value of the *Foreach Loop* container to a user-defined package variable. The container will then use this user-defined variable to dynamically modify the *ConnectionString* property of the *Flat File* connection manager and iteratively connect to each flat file in the folder. Because all the files in the folder have the same format, the *Foreach Loop* container can use the same Flat File connection manager to connect to each of these files. In the *Variable Mappings* page, let's create the variable.

Connection

Sample Flat File

Delete

OK

Cancel

Help

The variable name is *varFilename* – note that variable names are case sensitive.

The Foreach Loop container allows execution iteration over an enumeration.

General

Collection

Variable Mappings

Expressions

Select variables to map to the collection value.

Add Variable

Specify the properties of the new variable.

Container:

Package

Name:

varFilename

Namespace:

User

Value type:

String

Value:

☐ Read only

OK

Cancel

OK

Cancel

Help

Delete

Foreach Loop Editor



The Foreach Loop container allows execution iteration over an enumeration.

General
Collection
Variable Mappings
Expressions

Select variables to map to the collection value.

Variable	Index
User::varFilename	0

Delete

OK

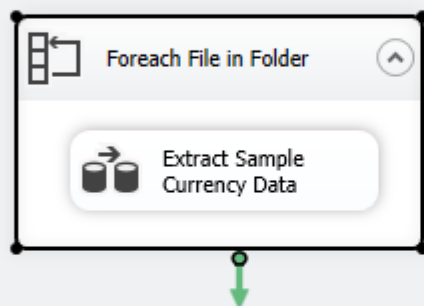
Cancel

Help

Drag the *Extract Sample Currency Data* Data Flow into the *Foreach File in Folder* component.

ETL Package.dtsx [Design]* X

Control Flow Data Flow Parameters Event Ha... Package E... Execution...



Connection Managers

Sample Flat File Source Data (local).AdventureWorksDW2022

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer

Class View

Properties

Foreach File in Folder ForEach Loop

List View Sort

FailPackageOnFailure False

FailParentOnFailure False

MaximumErrorCount 1

Forced Execution Value

ForcedExecutionValue 0

ForcedExecutionValueType Int32

ForceExecutionValue False

Identification

Description Foreach Loop Container

ID {79C414CD-3A8C-4D6F-B56

Name Foreach File in Folder

[Edit Breakpoints](#)

Name

Specifies the name of the object.

SSIS ETL Tutorial - Microsoft Visual Studio

FILE EDIT VIEW PROJECT BUILD DEBUG SSIS TOOLS WINDOW

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Ha... Package

Foreach File in Folder

Extract Sample Currency Data

Connection Managers

Sample Flat File Source Data AdventureWorksDW2022

We need to modify the connection manager that was previously created by using a user-defined variable to populate the connection manager's *ConnectionString* property. Let's edit the *Expressions* property of the *Sample Flat File Source Data*.

SSIS ETL Tutorial

- Project.params
- Connection Managers
- SSIS Packages

Solution Explorer Class View

Properties

Sample Flat File Source Data Connection

DelayValidation	False
Description	
Expressions	...
FileUsageType	0
Format	Delimited
HasExpressions	False
HeaderRowDelimiter	{CR}{LF}
HeaderRowsToSkip	0
ID	{51659FD2-3517-4F74-AD97}
LocaleID	English (United States)
Name	Sample Flat File Source Data

Show Editor

Expressions

A collection of expressions. The evaluation result of each expression is assigned to a property and replaces ...

Select the *ConnectionString* in the property expressions list.

Property Expressions Editor

Property expressions:

Property	Expression
ConnectionString	
AlwaysCheckForRowDelimiters	
CodePage	
ColumnNamesInFirstDataRow	
ConnectionString	
DataRowsToSkip	
Description	
FileUsageType	
Format	

Delete OK Cancel

Validation	False
Connection	
Options	
FileType	0
Delimited	Delimited
Expressions	False
RowDelimiter	{CR}{LF}
RowsToSkip	0
Guid	{51659FD2-3517-4F74-AD97-...}
LocaleID	English (United States)
Name	Sample Flat File Source Data

Expressions

A collection of expressions. The evaluation result of each expression is assigned to a property and replaces ...

Click to define the expression for the *ConnectionString*.

ETL Package.dtsx [Design]*

Control Flow Data Flow Parameters Event Ha... Package E... Execution...

Property Expressions Editor

Property expressions:

Property	Expression
ConnectionString	

Delete OK Cancel

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

ETL Package.dtsx

Solution Explorer Class View

Sample Flat File Source Data Connection

Validation	False
Location	
Options	...
HeaderType	0
Header	Delimited
HeaderExpressions	False
RowDelimiter	{CR}{LF}
RowsToSkip	0
ConnectionString	{51659FD2-3517-4F74-AD97-...}
LocaleID	English (United States)
Name	Sample Flat File Source Data

[Show Editor](#)

Expressions

A collection of expressions. The evaluation result of each expression is assigned to a property and replaces ...

Expand *Variables and Parameters* until the variable previously created is visible.

ETL Package.dtsx [Design]*

Solution Explorer

Control Flow

Data Flow

Expression Builder

Specify the expression for the property: ConnectionString.

Variables and Parameters

System Variables

User::varFilename

Mathematical Functions

String Functions

Date/Time Functions

NULL Functions

Type Casts

Operators

Description:

Expression:

Evaluated value:

Evaluate Expression

OK

Cancel

Connection Managers

Sample Flat File Source Data

(local).AdventureworksDW2022

Expressions

A collection of expressions. The evaluation result of each expression is assigned to a property and replaces ...

Drag the variable *varFileName* into the *Expression* text field.

ETL Package.dtsx [Design]*

Solution Explorer

Control Flow

Data Flow

Expression Builder

Specify the expression for the property: ConnectionString.

Variables and Parameters

System Variables

User::varFileName

Mathematical Functions

String Functions

Date/Time Functions

NULL Functions

Type Casts

Operators

Description:

Expression:

@[User::varFileName]

Evaluated value:

Evaluate Expression

OK

Cancel

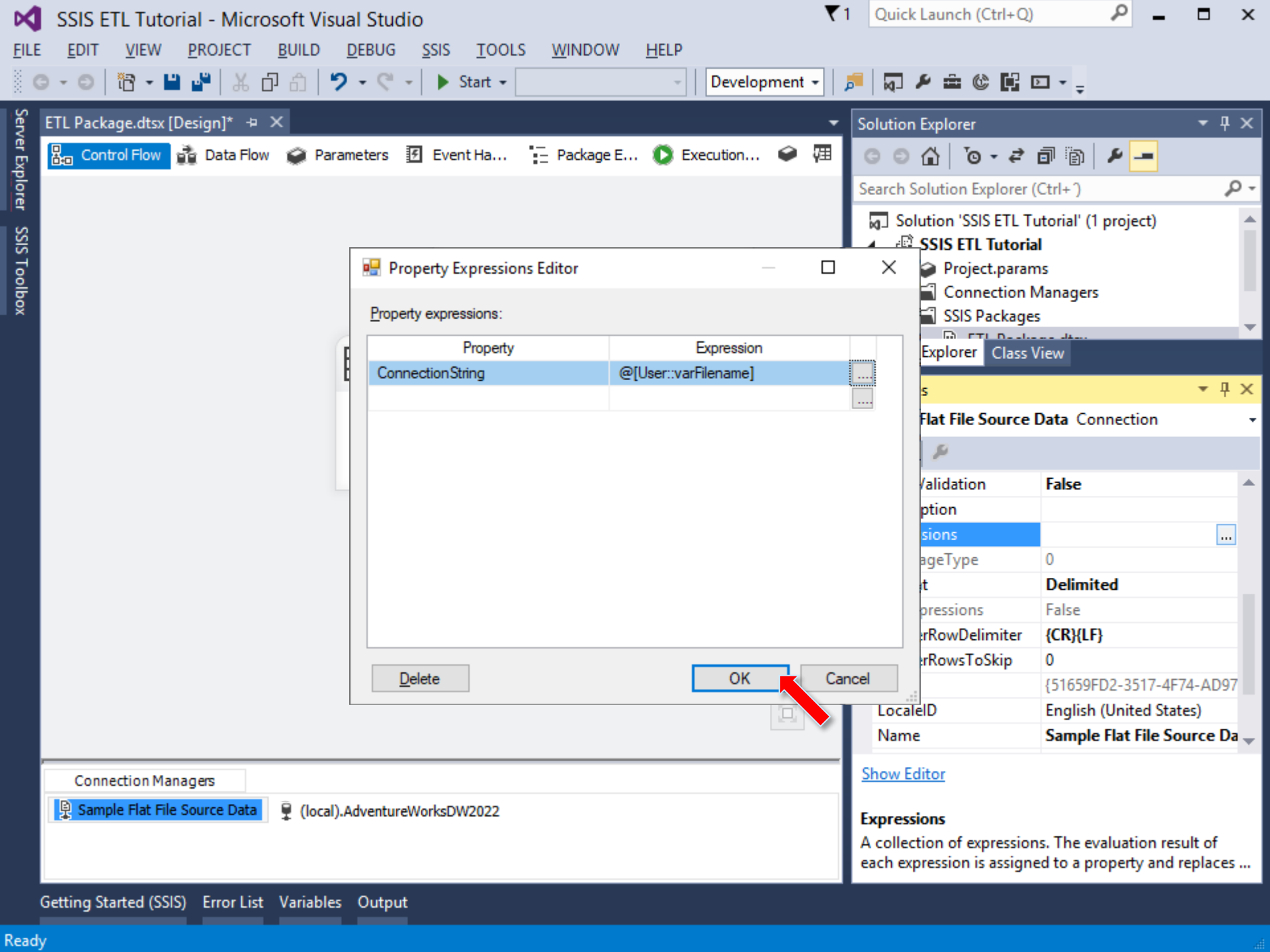
Connection Managers

Sample Flat File Source Data

(local).AdventureworksDW2022

Expressions

A collection of expressions. The evaluation result of each expression is assigned to a property and replaces ...

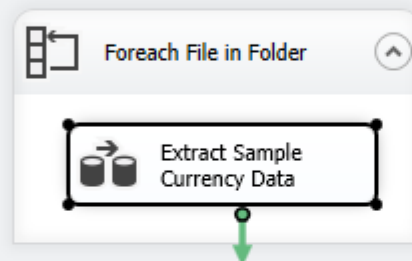


Let's run the package to see the results.



ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Ha... Package E... Execution...



Connection Managers

Sample Flat File Source Data (local)..AdventureWorksDW2022

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

Extract Sample Currency Data Task

MaximumErrorCount 1

Forced Execution Value

ForcedExecutionValue 0

ForcedExecutionValueT Int32

ForceExecutionValue False

Identification

Description Data Flow Task

ID {62D6E2FA-AF0F-47E2-B4B8-...}

Name Extract Sample Currency Data

PackagePath \Package\Foreach File in Folder

[Show Editor](#) [Edit Breakpoints](#)

Name

Specifies the name of the object.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Handlers Package Explorer Progress

Foreach File in Folder

Extract Sample Currency Data

100%

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Package execution completed with success. Click here to switch to design mode, or select Stop Debugging from the Debug menu.

The *Foreach Loop Container* iterates through the collection of files in the sample data folder. Each time a file is found that matches the criteria, the *Foreach Loop Container* populates the user-defined variable with the file name, maps the user-defined variable to the *ConnectionString* property of the *Sample Currency Data Flat File* connection manager, and then runs the data flow against that file. Therefore, in each iteration of the *Foreach Loop* the *Data Flow* task processes a different flat file.

The output window contains the execution results log – analyse this window to see that all the 14 Currency_*.txt files were successfully loaded.

Output

Show output from: Debug

```
\Documentos\Profissionais\Docência\Infor\SSIS\SSIS ETL Tutorial\Data\Currency_USD.txt" has started.
Information: 0x400490F5 at Extract Sample Currency Data, Lookup Currency Key [27]: Lookup Currency Key has cached a total of
105 rows.
Information: 0x40209340 at Extract Sample Currency Data, Lookup Currency Key [27]: The number of unique rows added to the cache
is 105.
Information: 0x402090E2 at Extract Sample Currency Data, Lookup Currency Key [27]: The Lookup Currency Key processed 105 rows
in the cache. The processing time was 0.015 seconds. The cache used 4200 bytes of memory.
Information: 0x402090E4 at Extract Sample Currency Data, Lookup DateKey [52]: The Lookup DateKey succeeded in preparing the
cache. The preparation time was 0.001 seconds.
Information: 0x4004300C at Extract Sample Currency Data, SSIS.Pipeline: Execute phase is beginning.
Information: 0x402090DE at Extract Sample Currency Data, Extract Sample Currency Data [2]: The total number of data rows
processed for file "D:\Documentos\Profissionais\Docência\Infor\SSIS\SSIS ETL Tutorial\Data\Currency_USD.txt" is 1097.
Information: 0x402090DF at Extract Sample Currency Data, Sample OLE DB Destination [77]: The final commit for the data
insertion in "Sample OLE DB Destination" has started.
Information: 0x402090E0 at Extract Sample Currency Data, Sample OLE DB Destination [77]: The final commit for the data
insertion in "Sample OLE DB Destination" has ended.
Information: 0x40043008 at Extract Sample Currency Data, SSIS.Pipeline: Post Execute phase is beginning.
Information: 0x402090DD at Extract Sample Currency Data, Extract Sample Currency Data [2]: The processing of file "D:
\Documentos\Profissionais\Docência\Infor\SSIS\SSIS ETL Tutorial\Data\Currency_USD.txt" has ended.
Information: 0x40209314 at Extract Sample Currency Data, Lookup DateKey [52]: The Lookup DateKey has performed the following
```

Getting Started (SSIS) Error List Variables Output

Progress tab (in execution mode) or the *Execution Results* tab (in design mode) also allows to see the results of the package execution.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Ha... Package E... Execution...

→ Progress: Validating - 25 percent complete
→ Progress: Validating - 50 percent complete
→ Progress: Validating - 75 percent complete
→ Progress: Validating - 100 percent complete
[i] [SSIS.Pipeline] Information: Prepare for Execute phase is beginning.
→ Progress: Prepare for Execute - 0 percent complete
→ Progress: Prepare for Execute - 25 percent complete
→ Progress: Prepare for Execute - 50 percent complete
→ Progress: Prepare for Execute - 75 percent complete
→ Progress: Prepare for Execute - 100 percent complete
[i] [SSIS.Pipeline] Information: Pre-Execute phase is beginning.
→ Progress: Pre-Execute - 0 percent complete
[i] [Extract Sample Currency Data [2]] Information: The processing of file "D:\Documentos\Profissionais\Docência\Infor\
→ Progress: Pre-Execute - 25 percent complete
[i] [Lookup Currency Key [27]] Information: Lookup Currency Key has cached a total of 105 rows.
[i] [Lookup Currency Key [27]] Information: The number of unique rows added to the cache is 105.
[i] [Lookup Currency Key [27]] Information: The Lookup Currency Key processed 105 rows in the cache. The processing
→ Progress: Pre-Execute - 50 percent complete
[i] [Lookup DateKey [52]] Information: The Lookup DateKey succeeded in preparing the cache. The preparation time wa
→ Progress: Pre-Execute - 75 percent complete
→ Progress: Pre-Execute - 100 percent complete
[i] [SSIS.Pipeline] Information: Execute phase is beginning.
[i] [Extract Sample Currency Data [2]] Information: The total number of data rows processed for file "D:\Documentos\Pr
[i] [Sample OLE DB Destination [77]] Information: The final commit for the data insertion in "Sample OLE DB Destination"
[i] [Sample OLE DB Destination [77]] Information: The final commit for the data insertion in "Sample OLE DB Destination"
[i] [SSIS.Pipeline] Information: Post Execute phase is beginning.
→ Progress: Post Execute - 0 percent complete
[i] [Extract Sample Currency Data [2]] Information: The processing of file "D:\Documentos\Profissionais\Docência\Infor\
→ Progress: Post Execute - 25 percent complete
→ Progress: Post Execute - 50 percent complete
[i] [Lookup DateKey [52]] Information: The Lookup DateKey has performed the following operations: processed 1097 ro
→ Progress: Post Execute - 75 percent complete

Solution Explorer

Search Solution Explorer (Ctrl+)

Solution 'SSIS ETL Tutorial' (1 project)

SSIS ETL Tutorial

Project.params

Connection Managers

SSIS Packages

Solution Explorer Class View

Properties

ETL Package Package

ID	{9FE47381-787B-4CF2-BA
Name	ETL Package
PackageType	DTSDesigner100
Misc	
Configurations	(Collection)
Expressions	
ForceExecutionResult	None
HasExpressions	False
LocaleID	Portuguese (Portugal)
LoggingMode	UseParentSetting
OfflineMode	False
SuppressConfiguration	False
UpdateObjects	False

Name

Specifies the name of the object.

ETL Package.dtsx [Design]

Control Flow Data Flow Parameters Event Handlers Package Explorer Progress

Foreach File in Folder

Extract Sample Currency Data

100%

Connection Managers

(local).AdventureWorksDW2022 Sample Flat File Source Data

Package execution completed with success. Click here to switch to design mode, or select Stop Debugging from the Debug menu.

Autos Locals Watch 1

Ready Add to Source Control Select Repository