

# 1

## Getting Started

This book is about applications. Specifically, this book is about applying the functionality of SQL Server 2005 Integration Services (SSIS) to help you envision, develop, and implement your data processing needs. The discussions throughout the book spotlight how SSIS can help you accomplish your data integration and processing requirements.

Core to the data processing that SSIS does best is extraction, transformation, and loading (ETL). Over the years, this ETL has taken on a range of different meanings, from the general perspective of moving data from somewhere to somewhere else, to the specific application of data warehousing ETL. In fact, ETL has its roots in business intelligence (BI) and data warehouse processing.

This chapter provides important background information for generalized ETL that DBAs will need, as well as basic data warehousing ETL concepts. In addition, this chapter includes a practical review of SSIS functionality and provides the foundation for building the book's examination of applying the functionality of SSIS to help you accomplish your individual goals in data integration and processing requirements.

## Choosing the Right Tool for the Job

If you have any inclination toward home remodeling, chances are you enjoy walking through the tools area of your local home improvement store. Hundreds of different tools have been manufactured that perform a variety of functions and, in some cases, some fairly esoteric uses.

Any novice handyman can attest to the adage that the right tool for the job makes the job easier. The same concept applies when it comes to handling data. There's no doubt that, depending on

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the right situation, there may be a specific tool to handle such a function. Think about all the different types of data processing needs that you have across your organization:

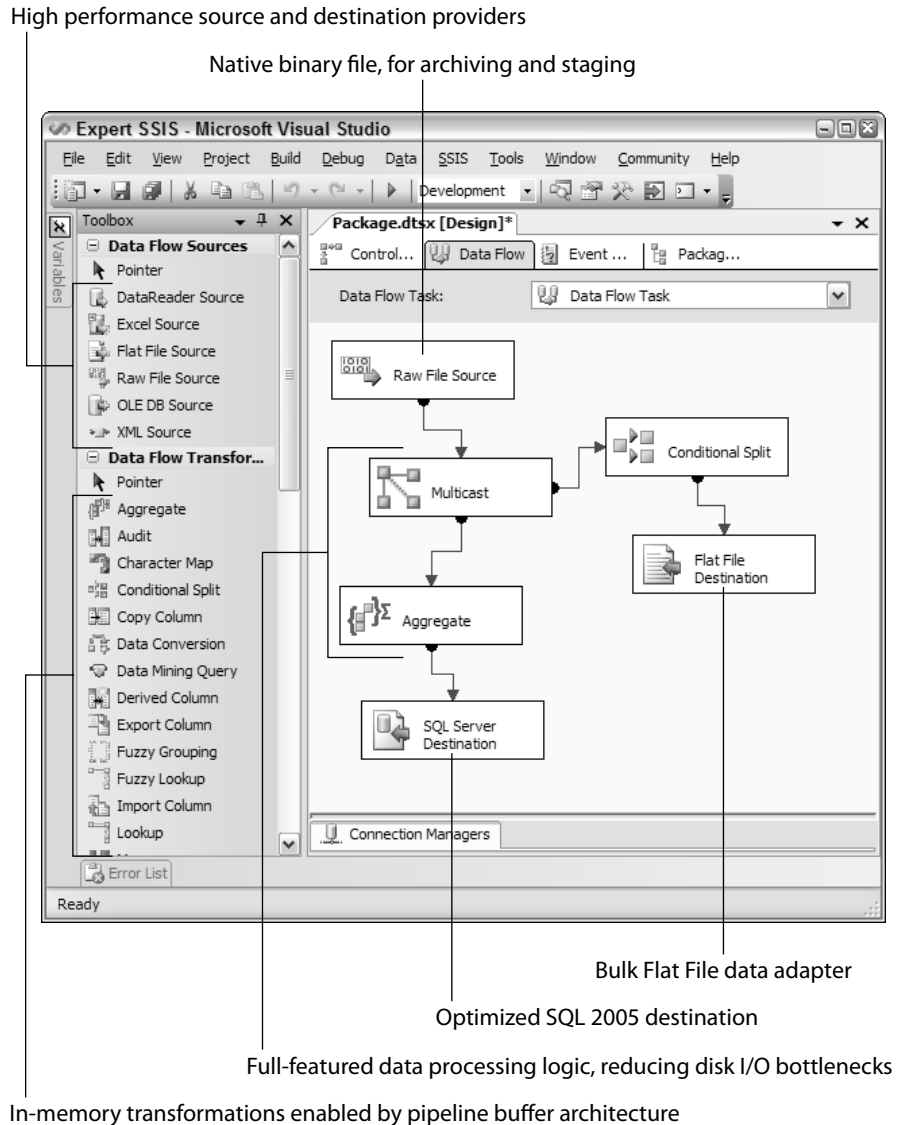
- ☐ Data synchronization between systems
- ☐ Data extraction from ERP systems
- ☐ Ad hoc reporting
- ☐ Replication (both homogeneous and heterogeneous)
- ☐ PDA data synchronization
- ☐ Legacy system integration
- ☐ Vendors and partner data files integration
- ☐ Line of business data
- ☐ Customer and employee directory synchronization
- ☐ Data warehouse ETL processing

As you may know, when it comes to data processing, there are a lot of tools out there. Some are created for specific situations (such as folder synchronizing tools), whereas other tools are designed to perform a variety of functions for different situations. So, the traditional question often posed is which tool can best meet the business and logical requirements to perform the tasks needed?

Consider the host of tools found in the ever-evolving Microsoft toolset. You can use Transact SQL (TSQL) to hand-code a load, Host Integration Server to communicate with a heterogeneous data source, BizTalk to orchestrate messages in a transactional manner, or SSIS to load data in batches. Each of these tools plays a role in the data world.

Although there can be overlaps, each tool has a distinct focus and target purpose. When you become comfortable with a technology, there's always the tendency to want to apply that technology beyond its intended "sweet spot" when another tool would be better for the job. You've no doubt heard the phrase "when you're a hammer, everything looks like a nail." For example, C# developers may want to build an application to do something that SSIS could potentially do in an hour of development time. The challenge everyone faces entails time and capacity. There is no way everyone can be an expert across the board. Therefore, developers and administrators alike should be diligent about performing research on tools and technologies that complement each other, based on different situations.

For example, many organizations use BizTalk for a host of purposes beyond the handling of business-to-business communication and process workflow automation. These same organizations may be perplexed as to why BizTalk doesn't scale to meet the needs of the organization's terabyte data warehousing ETL. The easy answer is that the right tool for bulk BI processing is an ETL tool such as SSIS. In fact, as shown in Figure 1-1, SSIS provides an excellent platform for leveraging its high-performance data pipeline.



**Figure 1-1: SSIS high-performance data pipeline**

The process outlined in Figure 1-1 may be simple enough, but essentially what SSIS does is to provide the technology to make the process efficient and scalable, and provide the functionality to handle data errors.

This chapter reviews ETL concepts in more detail, and gets you started with an SSIS example. Before diving into the expert level details found in the ensuing chapters, reminding you about ETL concepts and SSIS features will help solidify the background needed before moving to the details of the SSIS application.

### Be Careful About Tool Selection

In some client environments, an ETL tool may be chosen without consideration for the availability of industry skills, support, or even the learning curve. Even though the tool could perform “magic,” it usually doesn’t come with a pocket magician, just the magic of emptying your corporate wallet. In many cases, thousands of dollars have been spent to purchase an ETL tool that takes too long to master, implement, and support. Beyond the standard functionality questions you should ask about a tool, be sure to also consider the following:

- ☐ Your internal skill sets
- ☐ The trend of industry use of the tool
- ☐ How easy it is to learn
- ☐ The ease of supporting the tool

This book focuses on the three most common categories of SSIS usage:

- ☐ Data warehouse ETL
- ☐ Data integration
- ☐ SSIS administration

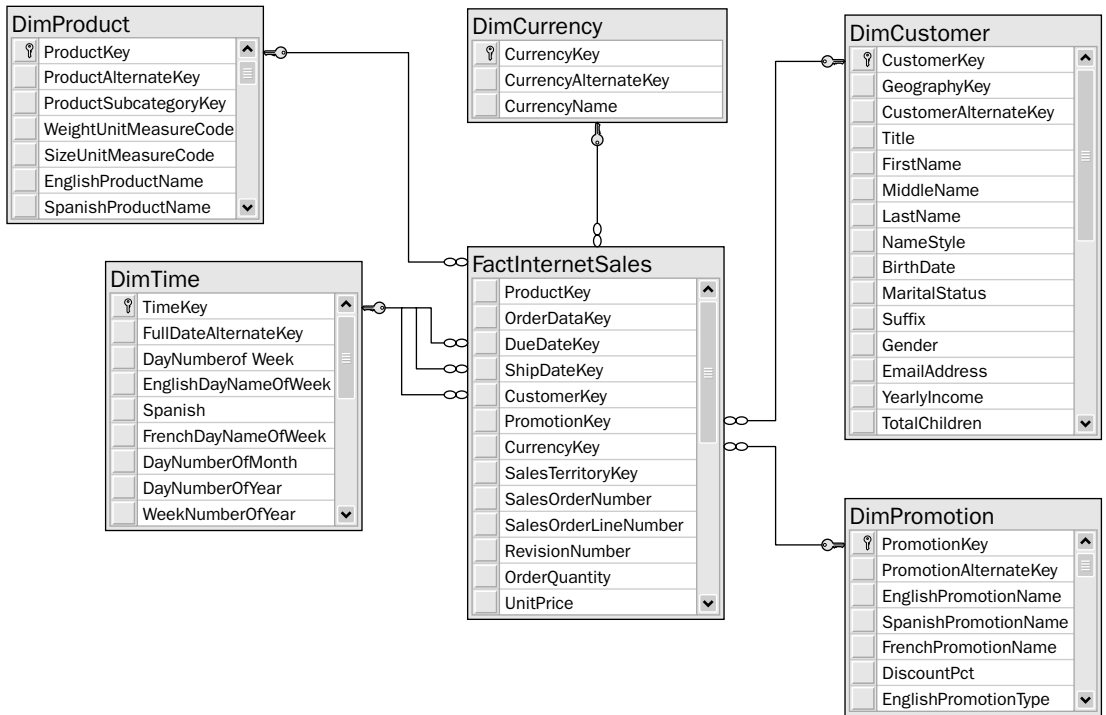
Before going any further, it makes sense to consider the purpose and background of each of these types of ETL.

## Data Warehousing ETL

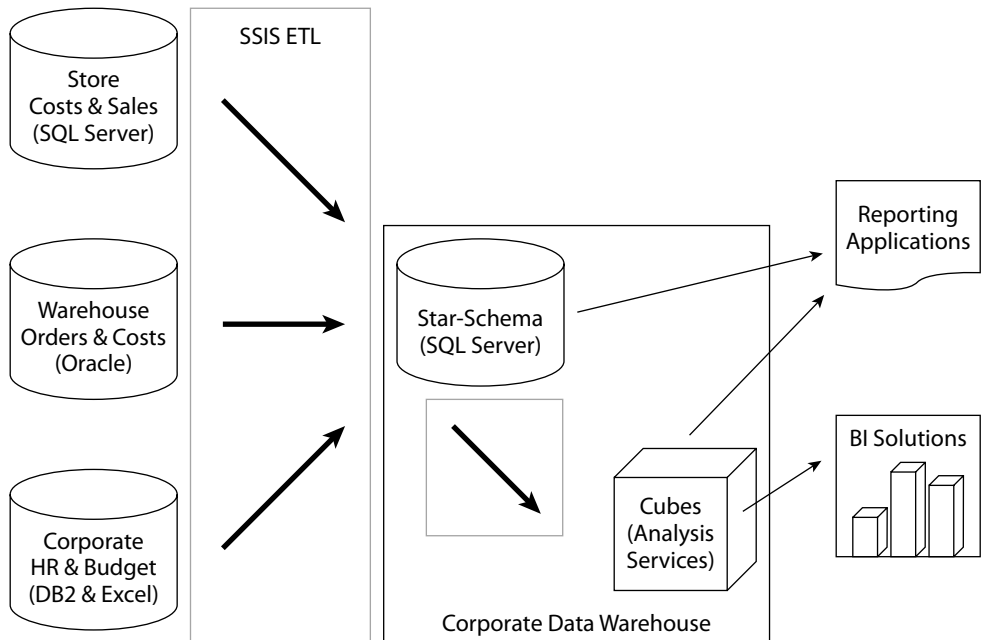
Some of you may be well-versed in data warehousing and related ETL concepts, but for those who are not, here is a high-level overview of data warehousing. Data warehousing focuses on *decision support*, or enabling better decision making through organized accessibility of information. As opposed to a *transactional system* such as a point of sale (POS), Human Resources (HR), or customer relationship management (CRM) that is designed to allow rapid transactions to capture information data, a data warehouse is tuned for reporting and analysis. In other words, instead of focusing on the entry of information, data warehousing is focused on the extraction and reporting of information to show trending, summary, and data history.

Databases designed for data warehousing are created in a structure called a *dimensional model*, which involves two types of tables. *Dimension tables* hold informational data or attributes that describe entities. *Fact tables* capture metrics or numeric data that describe quantities, levels, sales, or other statistics. A data warehouse may involve many dimension tables and fact tables. Figure 1-2 shows the relationships between several dimension tables and one fact table in a structure often called a *star schema*.

The focus of this book is not on the design of the dimension tables and fact tables, but rather on getting data into these structures from other repositories. Processing ETL for data warehousing involves *extracting* data from source systems or files, performing *transformation* logic on the data to correlate, cleanse, and consolidate, and then *loading* a data warehouse environment for reporting and analysis (see Figure 1-3).



**Figure 1-2: Star schema**



**Figure 1-3: The ETL system**

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For those who are already versed in ETL concepts and practice, you'll know that when it comes to developing a data warehouse ETL system, moving from theory to practice often presents the biggest hurdle. Did you know that ETL typically takes up between 50 and 70 percent of a data warehousing project? That is quite a daunting statistic. What it means is that even though presenting the data is the end goal and the driving force for business, the largest portion of developing a data warehouse is spent not on the presentation and organization of the data, but in the behind-the-scenes processing to get the data ready.

### **Data Integration**

You can also use SSIS to synchronize data between systems, or to replicate data. For example, you may want to create a business-to-business portal site, and you may need the site to interface with the source data on the mainframe. In this case, you may get the data delivered in nightly extracts from the mainframe and load it into your SQL Server table. Another very common ETL task that DBAs face is receiving files from File Transfer Protocol (FTP) servers (or on network shares) that must be processed and loaded into another system. This type of process involves moving files and then processing the data, which may involve de-duping, combining files, cleaning bad data, and so on.

Part of the job of integrating data may include data extraction. *Data extraction* is moving data out of a source, and, although it sounds easy enough, some of the challenges involve extracting only changes and also optimizing the extraction to make it scalable. Chapter 3 provides more information on data extraction for applying SSIS to data sources and extraction techniques.

In addition, if you think you have a perfect data source, think again! Chances are you will be dealing with missing data, mistyped data, `NULL` values, and just plain dirty data. Refer to Chapters 5 and 7 to learn how to handle real-world data situations. Data quality issues span a range of challenges, and you will need to plan your data cleansing to ensure you can accommodate your final goal of data processing.

### **SSIS Administration**

If you are a DBA responsible for SSIS packages (whether you created them or were given responsibility), then chances are you will have the responsibility of monitoring the package execution and ensuring that the transactions are correctly implemented to keep the database in a consistent state. Some of you will also be responsible for package deployment with a team of people, and securing packages so that only the right people have the ability to access and execute packages.

Although not every environment will be upgrading from SQL Server 2000 DTS, many DBAs do face this situation. DTS adoption was broad because of its ease of use and execution. And now that SSIS is here and proven, you may need to take your packages and move them to SSIS. This is easier said than done, given the architectural changes in the products. Chapter 11 provides more information on DTS migration to help get you there without losing your mind.

Yet another aspect of SSIS is database administration. In fact, in SQL Server 2005, SSIS is also used to help manage your database environment. For example, SQL Server maintenance plans (such as database

backups, index defragmentation, database consistency checking, and so on) use SSIS behind the scenes to coordinate the administration operations.

Optimizing and scaling SSIS is another common responsibility for both DBAs and developers alike. Chapter 12 targets scaling SSIS, including ways to optimize destinations and how to take advantage of SSIS functionality to make faster, more scalable packages.

## SSIS Review

Many of you have practical, learn-on-the-go experience using SSIS, and are looking to this book to take your knowledge to the next level and to fill in any knowledge gaps. Others of you have a good book knowledge of SSIS and want to extend your skills. And there may be those of you (like us) who like to dive right in, skip the intro books, and go right for the expert material.

To set the stage and provide a common starting point, we will walk you through a package creation that involves many of the SSIS key concepts. It's impossible to wrap all the SSIS functionality into this one example, but you will get a good review of the basic features. If you feel you already know how to use the basic SSIS features comfortably, feel free to skip this section. The ensuing discussions, however, assume that you know some of these basic concepts and will not walk you through these steps again. You should be familiar with some basics such as how to create a solution. This example assumes some SSIS background, so if you need a more fundamental review, see one of the starter SSIS books available such as *Professional SQL Server 2005 Integration Services* (Wiley Publishing, 2006).

In this package creation walk-through, you will start by developing a simple package Data Flow that pulls a limited range of data (by using package variables) from a source and adds some data transformation steps. Since SSIS includes more than just processing data, you will then be working with the control flow and creating complementary tasks and containers with Precedence Constraints to control what happens in what order in this example. The final step is executing the package.

To begin, first start by opening the Business Intelligence Development Studio (BIDS) tool and creating a new SSIS project called `ExpertSSIS`. Then, rename the default package that is created (`Package.dtsx`) to `Chapter1.dtsx`. Confirm that you'd like to rename the package object as well.

## Creating a Connection Manager

After creating the package, you can create the first connection manager. Right-click in the Connection Manager pane at the bottom of the package editor and select **New OLE DB Connection**. On the **Configure OLE DB Connection Manager** screen, if you do not have an **AdventureWorks** connection in the **Data Connections** list, click **New**. Type **localhost** for the **Server Name** property, and select **AdventureWorks** from the **Database** drop-down box. Click **OK** to save the connection, and click **OK** again when you have the `localhost.AdventureWorks` connection selected. Right-click the newly created `localhost.AdventureWorks` connection manager and rename it to **AdventureWorks**.

### **Using the Control Flow**

The Control Flow tab is where you perform the package's workflow. For example, you may decide to receive a file through FTP, transform the data within the file, and then archive the file. In that example, you would have three tasks:

- ☐ An FTP Task
- ☐ A Data Flow Task
- ☐ A File System Task

If you need help with the configuration of these tasks, consult one of the starter books such as the *Professional SQL Server 2005 Integration Services* book. Configuration of these tasks is not addressed in this book. Instead, we will concentrate on how to build solutions using the tasks.

In the Control Flow tab of the example package, drag over a single Data Flow Task onto the design pane. This Data Flow Task will perform the transformation of data. Rename the task **Create Product File** by right-clicking the task and choosing Rename.

Select Variables from the SSIS menu, which opens the Variables window. Create three variables in the window:

- ☐ RowCount as an int32 data type
- ☐ StartDate as a datetime data type
- ☐ EndDate as a datetime data type

Create the default value of the StartDate to some date in 2001, and set the default value of the EndDate variable to some date in 2007.

### **Working in the Data Flow**

When you double-click on the Data Flow Task, you are taken to the Data Flow tab. The Data Flow Task streams data from nearly any structured, semi-structured, or non-structured source to nearly any destination. In this case, you will pull data from a SQL Server source, transform the data by using a number of transformation components, and then write the result to a text file. Figure 1-4 shows the Data Flow tab in a package without the components defined yet. Notice that the toolbox contains adapters and transformations that you will be using throughout this book.



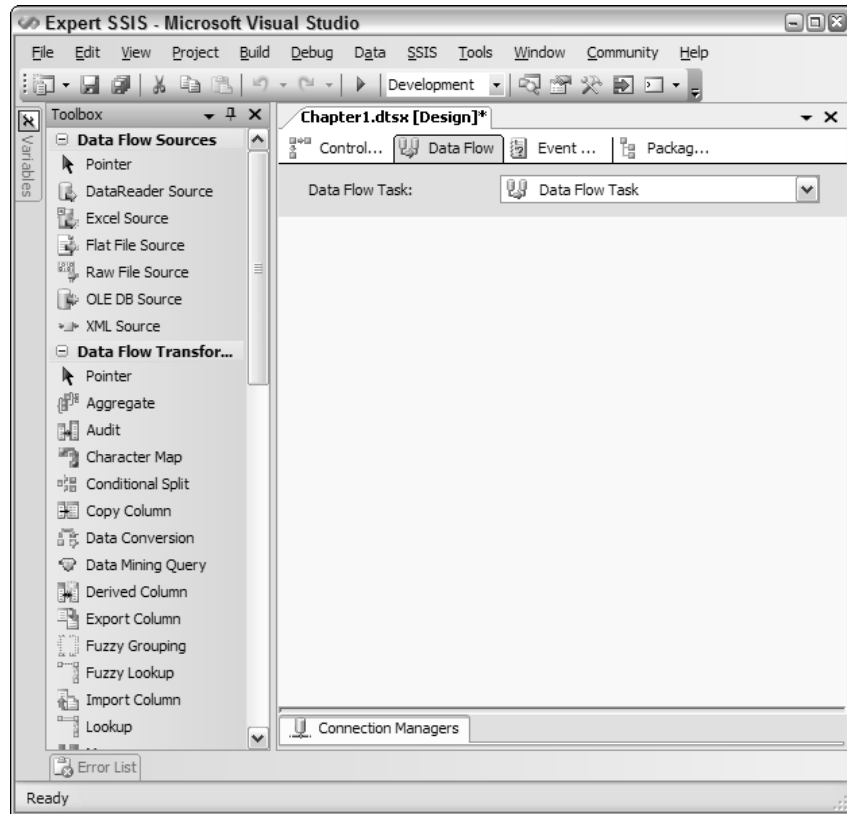


Figure 1-4: The Data Flow Task

Drag over an OLE DB Source from the toolbox. Name the source **Products**. Double-click the source to configure it, as shown in Figure 1-5. Ensure that you're pointing to the AdventureWorks connection manager and then change the Data access mode entry to SQL command. Enter the following command in the SQL command text window:

```
SELECT * FROM Production.Product
WHERE SellStartDate > ? and SellStartDate < ?
```

The query returns all the products that are within a certain date range. The question marks represent parameter values that will be passed in through a variable. Click the Parameters button to map the question marks to the variables you've already created. Each question mark parameter you see in the Set

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Query Parameters window is ordinal (see Figure 1-6). So, the first question mark is represented by `Parameter0`, the second by `Parameter1`, and so on. Map `Parameter0` to `User::StartDate` and `Parameter1` to `User::EndDate`. Click OK to go back to the Data Flow tab.

Next, drag a Lookup transform onto the design pane. Connect the Product source to the Lookup transform by dragging the green arrow from the source to the transform. Name the Lookup transform **Find Model Name**.

Open (by double-clicking) the Lookup transform to configure it. Point the transform to the AdventureWorks connection manager and to the `[Production].[ProductModel]` table by using the appropriate drop-down list boxes as shown in Figure 1-7. In the Lookup configuration dialog box, select the Columns tab and you'll see that there are more arrows connecting the input to the lookup columns than you actually need. Right-click each arrow and click Delete until the only one remaining is the arrow that connects `ProductModelID` on each side, as shown in Figure 1-7. Click Name from the Available Lookup Columns table and then type the Output Alias of **ModelName**.

Finally, click the Configure Error Output button. Change the Error column from Fail Component to Ignore Failure. Click OK twice to exit the transform configuration.

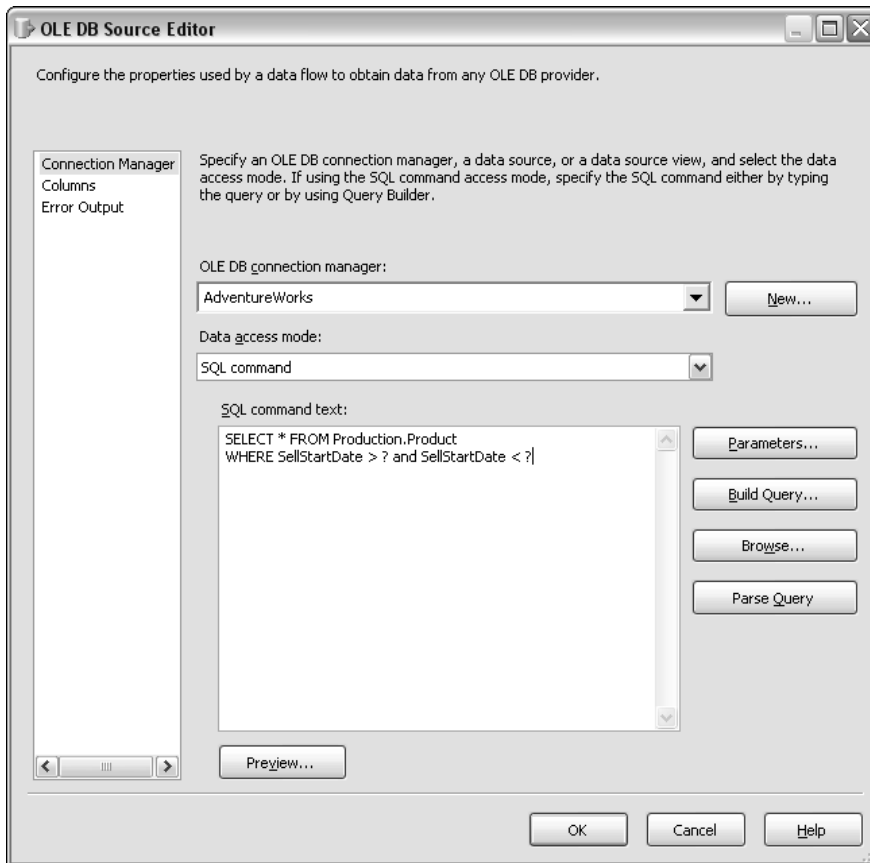


Figure 1-5: Configuring the source



Figure 1-6: Set Query Parameters window

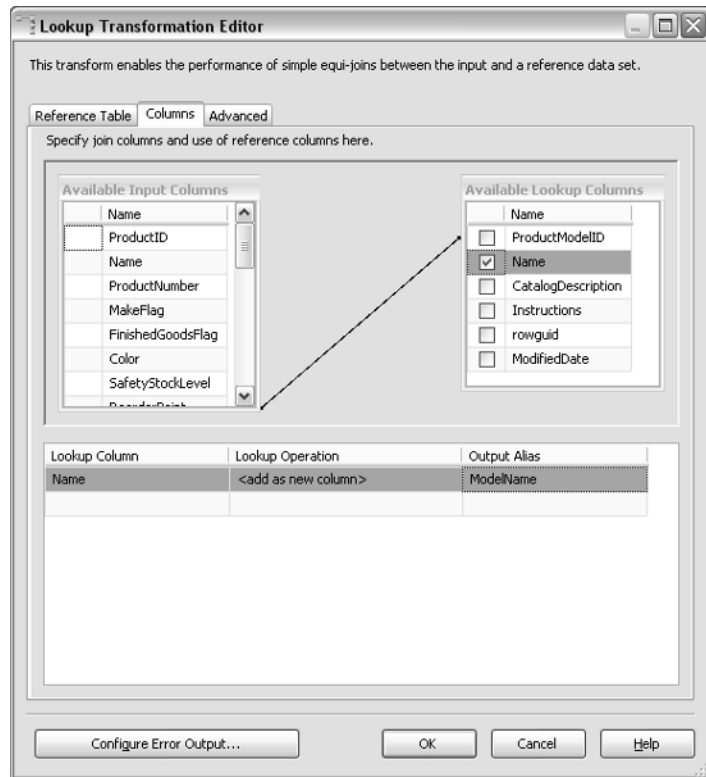


Figure 1-7: Deleting arrows

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As a review of the Lookup Transformation Editor, the first tab tells the component where to find the reference (lookup) data. The second tab tells the component which fields it should try to match in the source and reference data sets — the lookup column is the value you want to retrieve. Finally, the error output configuration tells the Lookup what to do with the row in the case of failure.

What this transform does for you now that it is completely configured is try to find the name of the model based on where the `ProductModelID` on the source matches the reference table. If it can't find a match, an error occurs. However, you have configured the transform to ignore the error, and so the `ModelName` column will now contain a `NULL` value if the match is not found. You could have also told the transform to redirect rows where it can't find a match to another output, which would be the red arrow coming out of the transform. At that point, you could have written those rows to a queue, or performed some additional cleanup.

**In some destination table loading (and definitely in data warehouse dimension table loading), if you can't find a matching record in the Lookup, then an "unknown value" needs to be inserted (a `NULL` value in many cases is not acceptable). A more elegant way to do this is through ignoring errors and using a derived column transform to replace `NULL`s with a default value.**

Drag a Derived Column transform onto the data flow and connect the output of the Lookup transform to the Derived Column. Name the Derived Column transform **Assign Default Values and Price**. In this scenario, you want to give a special customer discount on products that your company makes (the `MakeFlag` column lets you know if you made the product). There are two ways to perform this conditional assignment:

- ☐ Use a Conditional Split transformation and then a Derived Column transformation
- ☐ Use the Derived Column transformation and utilize the SSIS expression language to perform conditional coding

Open the Derived Column Transformation Editor (shown in Figure 1-8) in the data flow to configure the transform. For the first derived column name, you will want to replace the `NULL` values in `ModelName` with the word *Unknown*. You will want this to replace the existing column of `ModelName` by selecting `Replace 'ModelName'` from the Derived Column drop-down box. To solve a business requirement of not having `NULL`s in your warehouse, you can use the conditional operator of a question mark as shown here for the `Expression` column:

```
ISNULL([ModelName]) == TRUE ? "Unknown" : [ModelName]
```

Another entry in the Derived Column Transformation Editor will satisfy requirements for the discounted product price for products that you make. Again, you will want to change the Derived Column drop-down box to `Replace 'ListPrice'`. This time, the conditional logic will be slightly different. You're going to give a 10 percent discount on any product that you make, so you'll read the `MakeFlag` column. If it's set to true, then you'll discount. Otherwise, you'll use the existing price in the column. The code will look like this:

```
[MakeFlag] == TRUE ? [ListPrice] * 0.9 : [ListPrice]
```

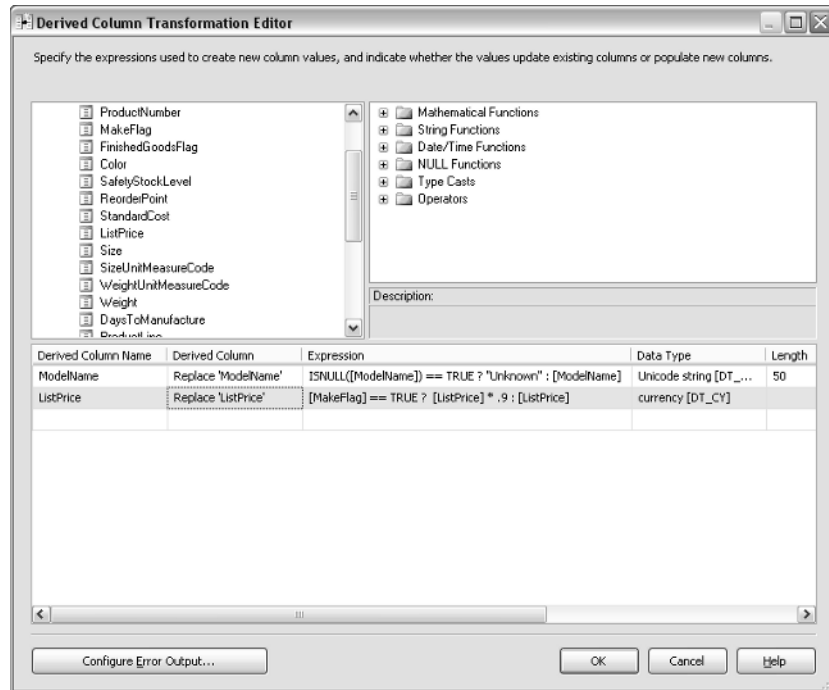


Figure 1-8: Derived Column Transformation Editor

In both of these columns, the `== TRUE` snippet of code is optional, but is useful for full self-documentation of code. If you were to have the statement `ISNULL([ModelName])`, it would essentially mean the same thing as this code. Also note that the columns and variables in the expression language are all case-sensitive.

Your final screen should look like Figure 1-8. Click OK to exit the editor.

Lastly, you want to audit how many rows you are about to write to the flat file. To do this, you can drag the Row Count transform onto the design pane. Connect the transform downstream of the Derived Column transform. Rename the Row Count transform to **Count Inserts** and double-click it to configure the transform.

Set the `VariableName` property in the Component Properties tab to `@intCount`. The variable name is case-sensitive. Because the last row is written through the transform, it is counted and logged to the variable for future use. A typical use for this transform is to count the number of rows transformed and write the result into an audit table.

With the data now transformed, you're ready to write the data to the extract file for use by another party (such as a business partner or another department). Drag over a Flat File Destination and rename

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it to **Partner Extract**. Double-click the destination to configure it. When the destination opens, click New to create a new connection manager. When the Flat File Format dialog box opens, select Delimited and click OK.

You're now taken to the Flat File Connection Manager Editor (shown in Figure 1-9). Name the connection manager **Partner Extract** and type **C:\ExpertSSIS\partnerextract.txt** for the file name (the directory, of course, must already be created). Select the Column names in the first data row check box.

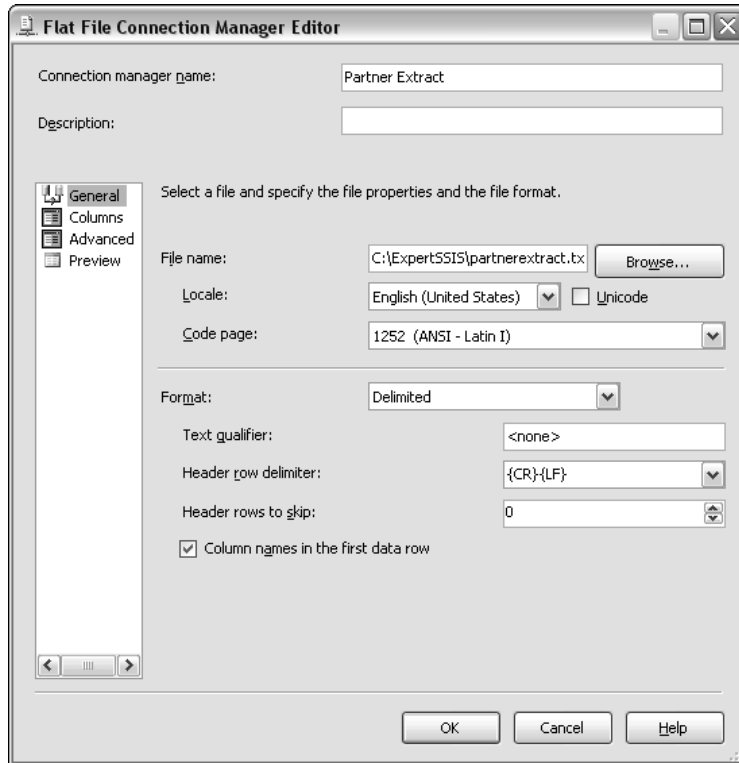


Figure 1-9: Flat File Connection Manager Editor

Next, go to the Columns page. In this page, make the column delimiter a vertical bar (|) by changing the Column delimiter drop-down box as shown in Figure 1-10.

Click OK to exit the editor and return to the Flat File Destination Editor. Click the Mappings page to confirm the data mappings and then click OK. Each time the data flow is run, the extract file is overwritten.

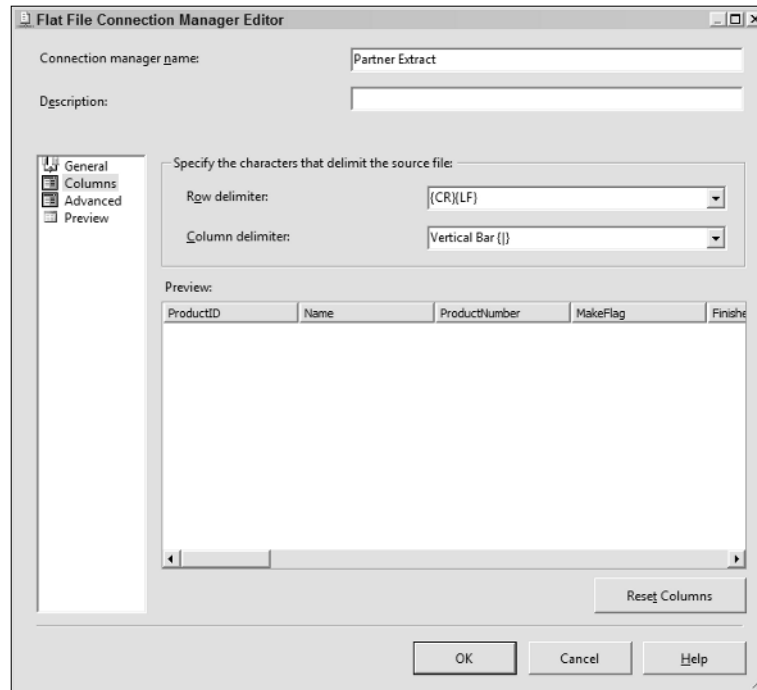


Figure 1-10: Changing the Column delimiter

## Precedence Constraints

*Precedence constraints* are the conductor for your workflow. They dictate which tasks will execute and in what order. Precedence constraints appear as lines in the control flow that connect one or more tasks together. The green arrow represents On Success and means that the second (or downstream) task will only execute if the first (or upstream) task or set of tasks executes successfully. The blue arrow represents On Completion and means that regardless of whether the upstream task completes successfully or fails, the downstream task will execute. This is useful for a clean-up task, for example. The red arrow represents On Failure and means that the downstream task will execute only if the upstream task fails.

You can also place expressions on the precedence constraint. With this functionality, you can put code on the constraint that states that the expressions must be true, and optionally the constraint must be true as well. These are useful if you want to add conditions into your control flow.

Returning to the example application, go to the Control Flow tab and drag over a Script Task onto the design pane. Rename the task to **Stub Code** and drag the green arrow out of the Data Flow Task onto the Script Task. Drag over one more Script Task and call it **Stub Code 2**. Drag the green arrow out of both of the other tasks onto Stub Code 2. These tasks will act only as placeholders for future code. The control flow should now look like Figure 1-11. Currently, Stub Code 2 will execute only after the first two tasks successfully execute.

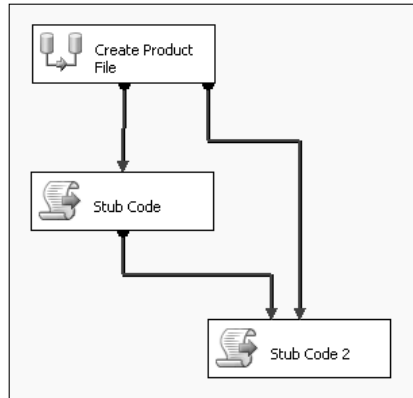


Figure 1-11: Current control flow

Double-click the precedence constraint between the Data Flow Task (named Create Product File) and the Stub Code Script Task. Change the Evaluation operation option to Expression and Constraint. The value should remain Success and the Expression should read `@intCount > 400`, as shown in Figure 1-12. Click the Test button to make sure you have valid syntax. As in the rest of SSIS, variable names are always case-sensitive. This configuration means that the Stub Code Task will execute if and only if *both* the Data Flow Task succeeds and it transforms more than 400 records (read from the Row Count transform in the data flow).

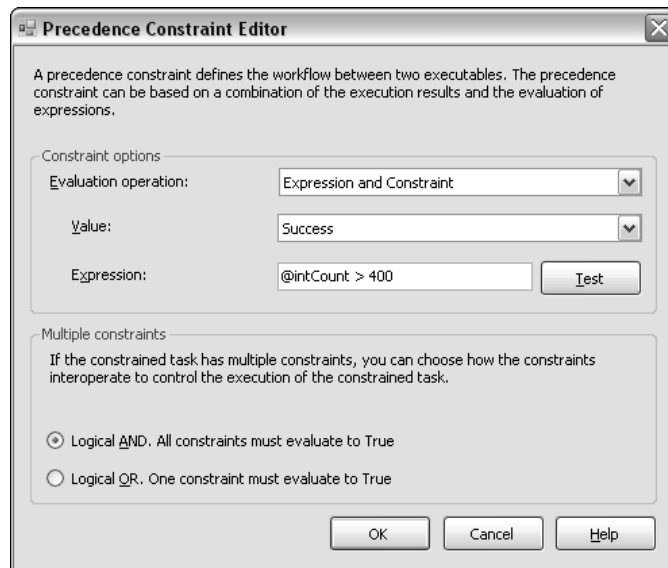


Figure 1-12: Success value and expression



In this configuration, if there are less than 400 rows transformed, Stub Code 2 will never execute, even though there's an On Success precedence constraint between the Data Flow Task and the task. This is because you have a Logical And condition on the Stub Task 2 when multiple constraints are connected into it. This means that both the Data Flow Task *and* the Stub Code Task must successfully execute before the Stub Code 2 Task executes. You may also want the Stub Code 2 Task to execute when either task successfully completes. To do this, you can double-click either of the precedence constraints that connect to Stub Code 2 and change the Multiple constraints option to Logical OR.

## Package Execution

Notice that after you change the constraint type, the solid green line turns into a dotted green line as shown in Figure 1-13. At this point, you're ready to execute the package by right-clicking the package in the Solution Explorer and clicking Execute Package. If you transformed less than 400 records, the package will look like Figure 1-13, where the Data Flow and Stub Code 2 executes.

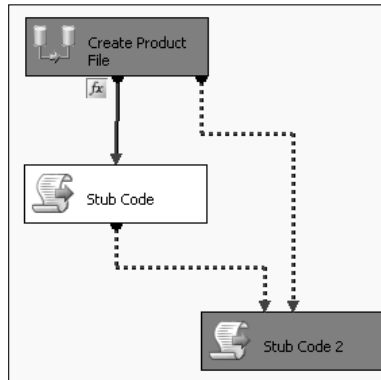


Figure 1-13: Solid line changing to dotted line

One way you can see how many rows transformed is to go to the Data Flow tab before stopping the package. You'll see how many rows transformed through the pipeline (shown in Figure 1-14). You can stop the package by clicking the Stop button (the square blue button on the BIDS toolbar) or by clicking Stop Debugging from the Debug menu. If you have any problems executing the package, you can go to the Progress tab to see the error. After you stop the package, the Progress tab turns into the Execution Results tab, which shows the results of the last package execution.

When you execute a package from the BIDS environment where you can see the results visually, you're executing the package in debug mode. You can also execute the package without debugging by selecting Start Without Debugging from the Debug menu. This performs slightly faster than executing a package from within debug mode, but it's much harder to troubleshoot an issue.

Executing a package outside of debug mode opens a command prompt, as shown in Figure 1-15, and runs the `dtexec.exe` utility. You can tell the package successfully executed by the `DTSER_SUCCESS` code at the end of the execution. You can also see how fast each task and container executed after each item completes in the command window, or how fast the entire package executed, which is shown at the bottom of the command line execution output (in the command window).

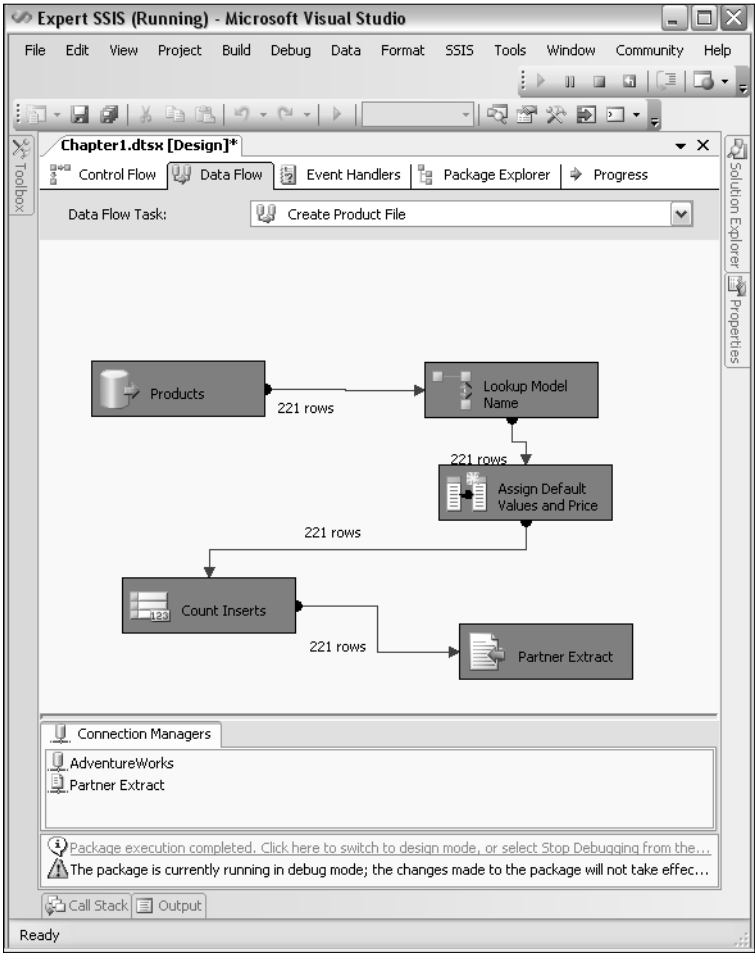


Figure 1-14: Viewing how many rows transformed through the pipeline

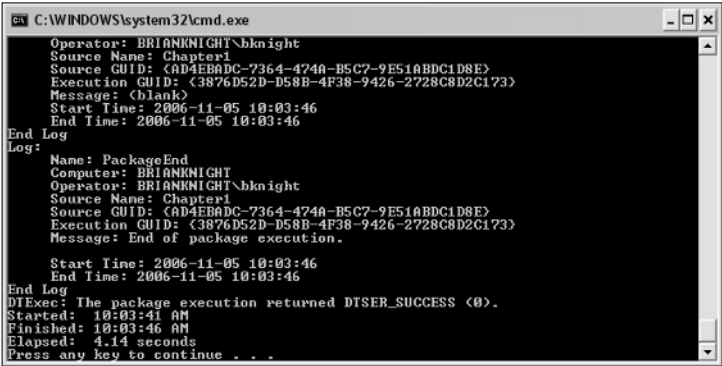


Figure 1-15: Execution of the dtexec.exe utility

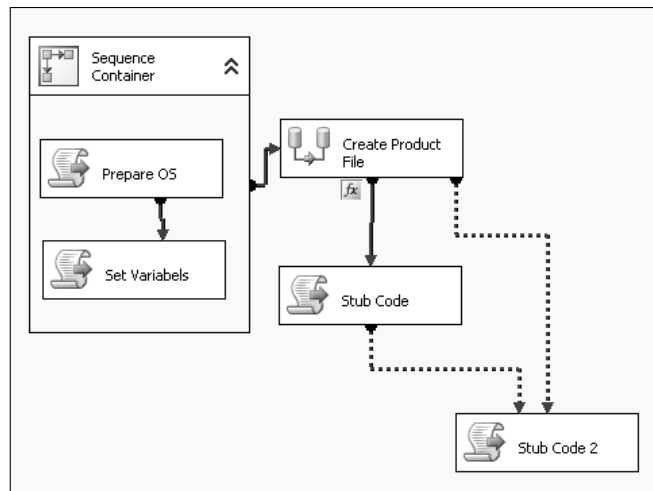
## Containers

With the package now complete, you could make it more advanced and cleaner by wrapping certain functionalities in containers. *Containers* help you group tasks logically together but also have other functionalities. There are three types of containers that you'll typically need to be concerned with:

- ☐ Sequence
- ☐ ForLoop
- ☐ ForEach Loop

There is actually a fourth type of container called `TaskHost`, which wraps every task behind the scenes.

The `Sequence` container group simply groups tasks visually inside a collapsible box, as shown in Figure 1-16. In this figure, `Prepare OS` and `Set Variables` will execute sequentially before allowing the `Create Product File` Task to execute. `Sequence` containers help you to clean up and abstract the details of your control flow, since you can minimize a container if you don't care about the complexity of what's happening inside the container. Events bubble up to the container, so if a failure occurs in a task, it will fail the parent container by default.



**Figure 1-16:** Sequence container grouping tasks together into a box

`Sequence` containers aren't just for looks though. You can also isolate transactions to a container so that if a problem occurs in a data task, you can roll back any other data action that had occurred in the container if it's participating in the container transaction. You can also log or create event handlers on anything in the container.

`ForLoop` containers enable you to do a `Do...While` loop inside the control flow. Any task inside the `ForLoop` container will loop continuously until the `while` condition is no longer met. This comes in handy if you want to continuously loop until a variable is set to `TRUE`.

One of the most important types of container is the `ForEach Loop` container. With this container, you specify a collection of items to enumerate through, and then any items inside the container will loop

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until SSIS enumerates to the end of the collection. Out of the box, you can enumerate through a collection of files in a directory, records in a table, or a list of items that you type. There are other types of enumerators that you can specify, and you can even write your own enumerator.

It's also important to note that after you place a set of tasks inside a container, they can only relate through precedence constraints to other tasks in the container. An individual task inside the container can never relate directly to anything else outside the container. The last thing to point out about containers is that you can embed containers inside containers.

## Review Conclusion

Even though this walk-through only highlights the data flow and control flow, you still can see that SSIS is a broad-featured tool capable of a lot of diverse applications.

In the end, it's all about the data — ensuring that the information is handled in the right way to meet your needs. This does not minimize the supporting requirements such as transactions handling, deployment, and execution monitoring, because these are important pieces to building a stable SSIS environment. When you take the primary data processing tasks and add in administration, error handling, scalability, testing, and deployment, the result is like juggling spinning plates. It's no wonder why ETL consumes up to 70 percent of an enterprise data warehouse development effort.

You may know this already: If you can reduce the amount of time it takes to build an ETL solution (including the supporting architecture), then your projects are in a better position for success. This is the value proposition of SSIS — a tool that can integrate all the needed features for a complete ETL system in an architecture that is supportable and extendable. With the right tool and right architecture, more time can be spent on testing the data and presenting the data to the users.

## Summary

There are two keys to a successful ETL solution:

- ❑ Using the right enterprise ETL tool
- ❑ Employing the right ETL architecture to meet the requirements

First, with SSIS, you'll find the out-of-the-box features provide the depth and breadth of functionality and flexibility needed to create efficient, reliable, and scalable solutions. What's more, the usability and rapid learning curve reduce solution development time. The second ingredient is addressed in the rest of the pages of this book. As a practical guide for SSIS ETL development, you will learn ways to implement your ETL solution requirements from the data to the administration and everything in-between. Putting it all together to get a solution over the goal line requires knowing the big picture and coordinating all the pieces.

Now that we have made the case for SSIS and reviewed some main features, it is time to dig in. In Chapter 2, we will start by considering scripting. Using the Script Task and Script Component in the right ways is central to applying SSIS, and in many of the later chapters, some scripting will be used to handle common situations that cannot be easily applied with other out-of-the-box features.