

*Point-and-Click  
Access to the  
Power of SAS®*

# The Little SAS® Book

*for*  
Enterprise  
Guide® 4.2

*Susan J. Slaughter and Lora D. Delwiche*



## Praise from the Experts

"If you are a SAS Enterprise Guide user at any level, this book is essential. It is written in plain English, easy-to-follow, and well illustrated. *The Little SAS Book for Enterprise Guide 4.2* is thorough, with well-explained examples that give the user the ability to utilize the software efficiently. As with all of the 'Little SAS Books' authored by Susan Slaughter and Lora Delwiche, the care and attention given to the creation of the indexes stands above other technical books, making its effectiveness quite appreciated by the reader. If someone asks me a SAS Enterprise Guide question, this is the resource I will point them to!"

**Jenine Milum  
President of the Charlotte (NC) SAS Users Group**

"*The Little SAS Book for Enterprise Guide 4.2* is an effective resource for learning and using this powerful and productive SAS product. Susan and Lora divide their book into tutorial and reference sections. The tutorials have good screenshots and clearly walk you through four projects. This makes getting started with SAS Enterprise Guide easy and fast. The reference section takes you beyond 'getting started' and gives you a deeper understanding of SAS Enterprise Guide. It includes new features, such as task templates. This is a book that we will recommend to our students and clients."

**Ginger Carey and Helen Carey  
SAS Enterprise Guide Instructors**

"Once again Susan and Lora have produced a book that will be a 'must-have' for new users to SAS Enterprise Guide 4.2, whether they are new to the SAS Enterprise Guide family or, like me, making the move from earlier versions of SAS Enterprise Guide."

**Peter Eberhardt  
Fernwood Consulting Group Inc.**

"Lora and Susan's latest addition to their popular 'Little SAS Book' series brings the power and flexibility of SAS Enterprise Guide 4.2 capabilities to the desktops of both new and experienced users of this latest update to menu-driven business intelligence tool from SAS. Their real-world experience as SAS programmers and trainers is reflected on every page of their book. Intuitive step-by-step tutorials and easy-to-understand explanations enable novice SAS Enterprise Guide 4.2 users to apply powerful data management, reporting, analysis, and graphing features within minutes of starting their first session with the product. And, experienced SAS Enterprise Guide users and SAS programmers will appreciate how well the book enables them to apply their existing skill via this new graphical interface to longstanding SAS tools. You'll want to keep this text within easy reach as you apply SAS Enterprise Guide 4.2 capabilities to your projects and programs."

**Andrew H. Karp**  
**Principal Consultant, Sierra Information Services**  
**[www.SierraInformation.com](http://www.SierraInformation.com)**

*"The Little SAS Book for Enterprise Guide 4.2 guides you through the multiple functionalities of SAS Enterprise Guide in a logical, stepwise manner. First, you complete a specific job via tutorials. Then you extend your scope and gain flexibility by being introduced to more advanced methods. Learning by doing is an invaluable benefit of the book tutorials. The many screen captures provided allow you to learn away from your computer. The side-by-side page formatting provides short-term goals to optimize your time. The Little SAS Book for Enterprise Guide 4.2 is the reference for learning about SAS Enterprise Guide on your own."*

**Véronique Bourcier**  
**[www.sasreference.com](http://www.sasreference.com)**



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*for*

## Enterprise Guide® 4.2

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*Susan J. Slaughter and Lora D. Delwiche*

**THE  
POWER  
TO KNOW®**

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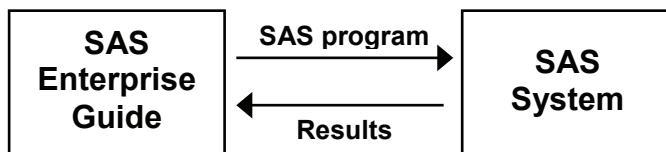
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## About SAS Enterprise Guide

For over three decades, SAS software has been used by programmers, analysts, and scientists to manipulate and analyze data. Today, SAS (pronounced sass) is used around the world in 120 countries and at more than 45,000 sites. SAS users stay with SAS year after year because they know its broad flexibility and depth of functionality will enable them to get the work done. However, not everyone wants to write programs.

**What SAS Enterprise Guide is** SAS Enterprise Guide gives you access to the power of SAS via a point-and-click interface. SAS Enterprise Guide does not itself analyze data. Instead, SAS Enterprise Guide generates SAS programs. Every time you run a task in SAS Enterprise Guide, it writes a SAS program. The List Data task, for example, writes a PROC PRINT. The Summary Tables task writes a PROC TABULATE. There are over 80 such tasks offered within SAS Enterprise Guide. When you click **Run** in SAS Enterprise Guide, it submits the program to SAS. SAS runs the program, and then sends the results (such as reports, graphs, data tables, and SAS logs) back to SAS Enterprise Guide so that you can see them.



You don't have to be a programmer to use SAS Enterprise Guide, but, if you would like to see the SAS program that SAS Enterprise Guide writes for you, you can do that too. You can also edit the programs written by SAS Enterprise Guide, or open an empty Program window and write a SAS program from scratch using a syntax-sensitive editor similar to the one in Base SAS. Then you can run your SAS program, and view the SAS log and output. So, SAS Enterprise Guide meets the needs of programmers and non-programmers alike.

**What software you need** To run SAS Enterprise Guide, you need, of course, SAS Enterprise Guide software. SAS Enterprise Guide runs in only the Windows operating environment. Because SAS Enterprise Guide writes programs and submits them to SAS, you also need a machine on which Base SAS is installed. That machine is called a SAS server, and it may be the same machine where SAS Enterprise Guide is installed (in which case, it is called a local server) or it may be a separate machine (called a remote server). SAS runs in many operating environments and on many types of computers. Any computer running SAS can be a SAS server as long as you have access to that machine.

You may have more than one SAS server. For example, you might have SAS installed on both your desktop computer and on a mainframe computer. In that case, you can use SAS Enterprise Guide to run analyses on either computer. When you run a SAS program, you can specify which server you want to use. When you submit a task, it will run on the server where the data table is stored.

SAS has many different products. To run SAS Enterprise Guide, you need only a few. You must have Base SAS software installed on your SAS server. If you have a remote SAS server, you may need a product called SAS Integration Technologies. If you want to run statistical analyses, then you must also have SAS/STAT software. For running econometric time series analyses, you need SAS/ETS software. For graphics, you need SAS/GRAFPH software. Except in special cases, you probably won't need SAS/ACCESS software. (See section 2.1 for more information about using SAS/ACCESS software with SAS Enterprise Guide.)

**Getting Help** We have tried to design this book to answer any questions you are likely to have. In addition, SAS Enterprise Guide has extensive built-in help (accessible via the Help menu). If you still have questions, you may want to contact SAS Technical Support. With some software companies, very little technical support is available, or the support is available but only for an extra charge—not so with SAS. All licensed SAS sites have access to SAS Technical Support.

There are several ways to contact SAS Technical Support, including via their Web site, [support.sas.com](http://support.sas.com), or via phone at (919) 677-8008. Before you contact SAS Technical Support you must know your site number and the version of SAS Enterprise Guide that you are running. To find these, start SAS Enterprise Guide and select **Help ▶ About SAS Enterprise Guide**. The About SAS Enterprise Guide window will open, displaying both the version of software and your site number.

## About This Book

This book is divided into two distinct but complementary sections: a tutorials section and a reference section. Each tutorial is designed to give you a quick introduction to a general subject. The reference section, on the other hand, gives you focused information on specific topics.

**Tutorials section** If you are new to SAS Enterprise Guide, you'll probably want to start with the tutorials. Each of the four tutorials leads you step-by-step through a complete project, from starting SAS Enterprise Guide to documenting what you've done before you exit. The tutorials are self-contained so you can do them in any order. People who know nothing about SAS or SAS Enterprise Guide should be able to complete a tutorial in 30 to 45 minutes.

**Reference section** Once you feel comfortable with SAS Enterprise Guide, you'll be ready to use the reference section. This is where you'll turn when you need a quick refresher on how to join data tables, or a detailed explanation of filtering data in a query. With 12 chapters and 93 topics, the reference section covers more information than the tutorials, but each topic is covered in just two pages so you can read it in a few minutes.

**The data for this book** The data used for the examples in this book revolve around a theme: the Fire and Ice Tours company, a fictional company offering tours to volcanoes around the world. Using a small number of data sets over and over saves you from having to learn new data for every example. The data sets are small enough that you can type them in if you want to run the examples, but to make it even easier, the data are also available for downloading via the Internet. Appendix A contains both the data and instructions on how to download the data files.



## Acknowledgments

How do you describe something that is dynamic and graphical with mere printed words and static screen shots? That's the fundamental challenge we have faced in writing this book. We have struggled at every point: finding the best and most useful features, discovering all those little points of confusion that are likely to trip up users of the software, and wrestling with sentences in an effort to express ideas clearly within the confines of a two-page format. Now that we are nearing the completion of this project, we offer this quote to describe our feelings:

Zounds! I was never so bethump'd with words.

William Shakespeare, King John

Fortunately, we've had plenty of help with those words. Among the many people we'd like to thank are our software installation team: David Gray, Chris Hemedinger, and Shelly Sessoms; our technical reviewers: Marilyn Adams, David Bailey, Marie Dexter, Paul Grant, Chris Hemedinger, Rich Papel, Stacey Syphus, Jennifer Tamburro, and Cynthia Zender; our technical publishing specialist, Candy Farrell; our designers: Patrice Cherry and Jennifer Dilley; our marketing specialists: Stacey Hamilton and Shelly Goodin; our copy editor, Kathy Underwood; our managing editor, Mary Beth Steinbach; and Julie Platt, Editor-in-Chief. All these people worked hard to ensure that this book is accurate and appealing. Special thanks go to Stephenie Joyner, our acquisitions editor.

And, as always, we thank our families for everything.



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“ Dimidium facti qui coepit  
habet. ”

“ What's well begun is half  
done. ”

HORACE

From *Epistolae*, I. 2. 40, 20 BC. As quoted in *The Cyclopaedia of Practical Quotations: English, Latin, and Modern Foreign Languages* by Jehiel Keeler Hoyt, 1896.

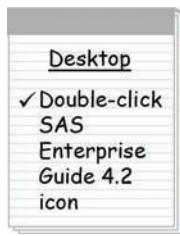
**A**

## Getting Started with SAS Enterprise Guide

This first tutorial will give you a basic understanding of how SAS Enterprise Guide works and how quickly tasks can be accomplished. The following topics will be covered:

- Starting SAS Enterprise Guide
- A quick tour of SAS Enterprise Guide windows
- Data types
- Entering data into the Data Grid
- Using SAS Enterprise Guide tasks
- Making changes to tasks

The data for this tutorial come from the Fire and Ice Tours company, a fictional company that arranges tours of volcanoes around the world. For each tour, the company keeps track of the name of the volcano, the city from which the tour departs, the number of days of the tour, and the price. Because the tours can require some physical exertion, the company gives each tour a difficulty rating: easy, moderate, or challenging.

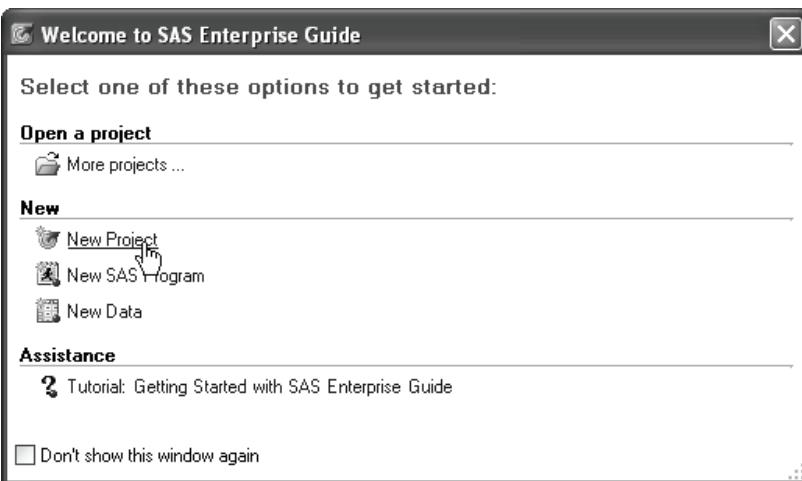


### Starting SAS Enterprise Guide

Start SAS Enterprise Guide by either double-clicking the **SAS Enterprise Guide 4.2** icon on your desktop, or selecting **SAS Enterprise Guide 4.2** from the Windows **Start** menu. Starting SAS Enterprise Guide brings up the SAS Enterprise Guide windows in the background, with the Welcome window in the foreground. The Welcome window allows you to choose between opening an existing project or starting a new project. Click **New Project**.

### SAS Enterprise Guide Projects

SAS Enterprise Guide organizes all your work into projects. You can work on only one project at a time, and each project is stored in a single file. A project will contain all the reports that you produce, plus shortcuts to all the data files that you use.



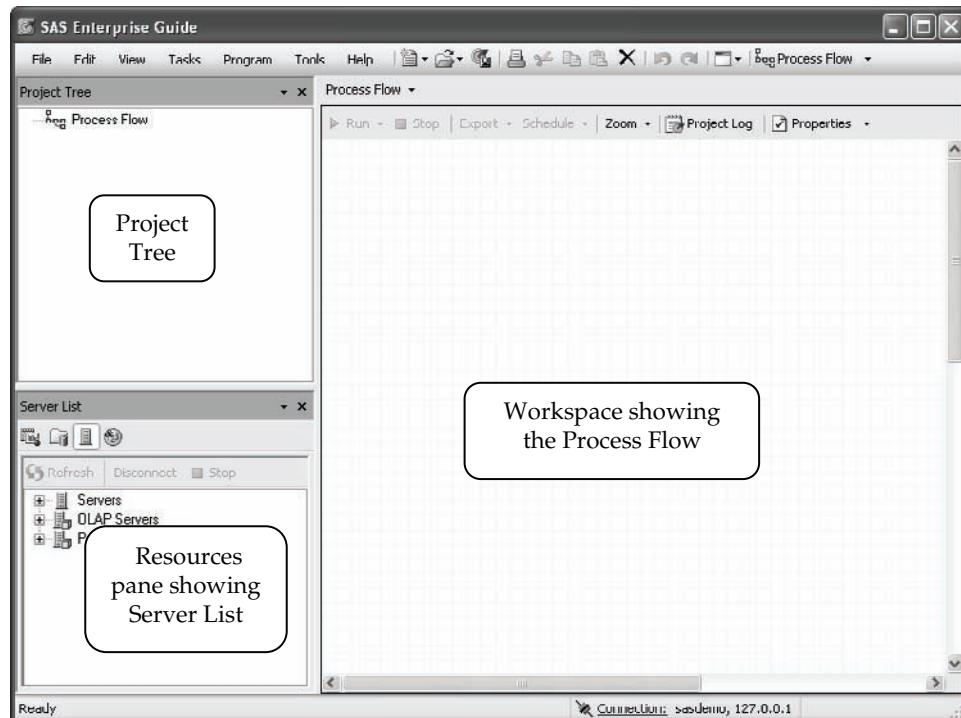
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### SAS Enterprise Guide

**windows** When you first start SAS Enterprise Guide, your screen should look something like the following. There are several parts to the SAS Enterprise Guide window: some are visible, while others may be hidden or temporarily closed.

### Resetting the SAS Enterprise Guide Windows

Does your screen look like this? If not, it may be because someone has already used SAS Enterprise Guide on your computer, and made some changes to the initial settings. To reset the windows, select **Tools ▶ Options** from the menu bar. Then click **Restore Window Layout**.



### Basic elements of SAS Enterprise Guide

**Project Tree:** This window displays your project in a hierarchical tree diagram.

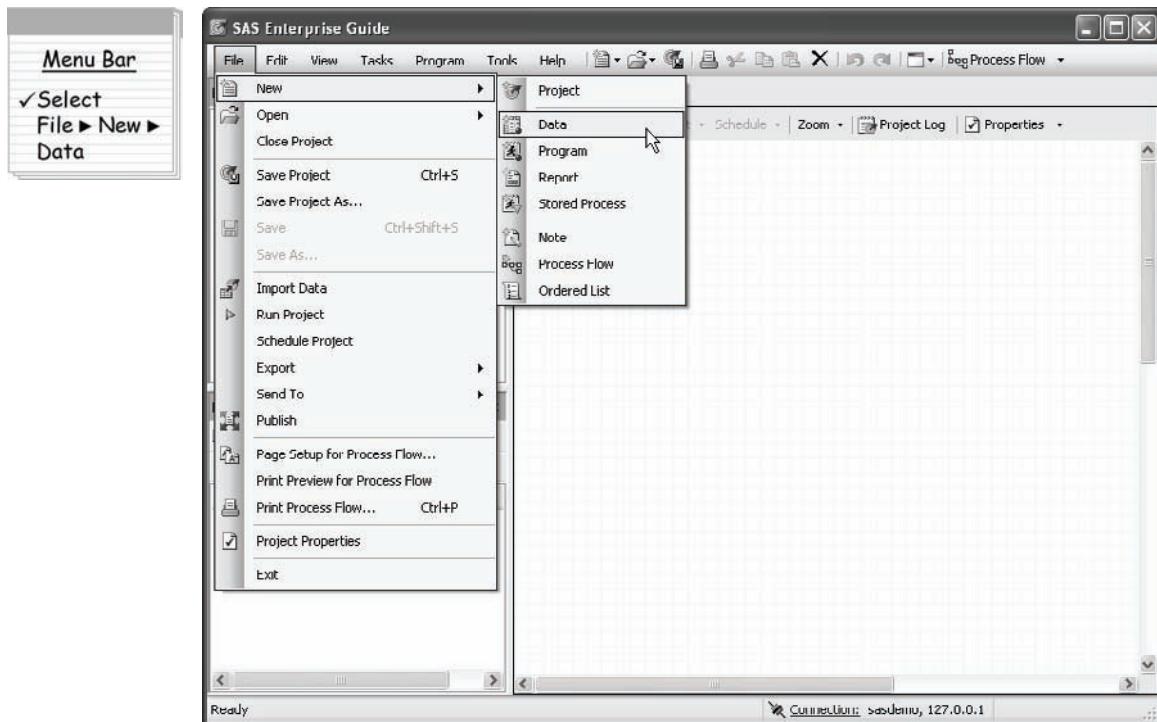
**Workspace:** This is a container for the Process Flow, results from tasks that you run, Data Grids, SAS code, SAS logs, and Notes.

**Process Flow:** This window displays a graphical representation of your project.

**Resources pane:** This pane shows either the Server List, Task List, SAS Folders, or Prompt Manager windows. The Server List window displays all the SAS servers that you can access during your SAS Enterprise Guide session. A SAS server is any computer on which SAS software is installed. The Task List displays all available tasks. The SAS Folders contain links to all your stored processes, information maps, and projects. The Prompt Manager displays all available prompts. To switch between the windows, click their icons at the top of the pane:  for the Server List,  for the Task List,  for SAS Folders, or  for the Prompt Manager.

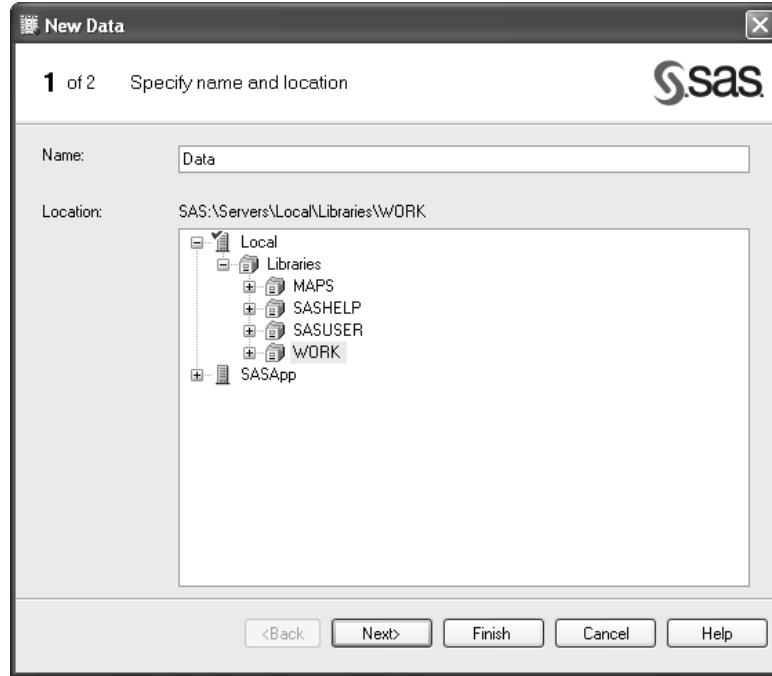
**Task Status (not shown):** When you are running a task, messages about the progress of the task appear in the Task Status window. To open the Task Status window, select **View ▶ Task Status** from the menu bar.

**Entering data** There are many ways to get data into SAS Enterprise Guide, and SAS Enterprise Guide can use data from a variety of sources, including SAS data sets, Microsoft Excel files, and plain text files. For this example, you are simply going to type the data directly into SAS Enterprise Guide. To bring up the Data Grid so you can enter the data, select **File ▶ New ▶ Data** from the menu bar.



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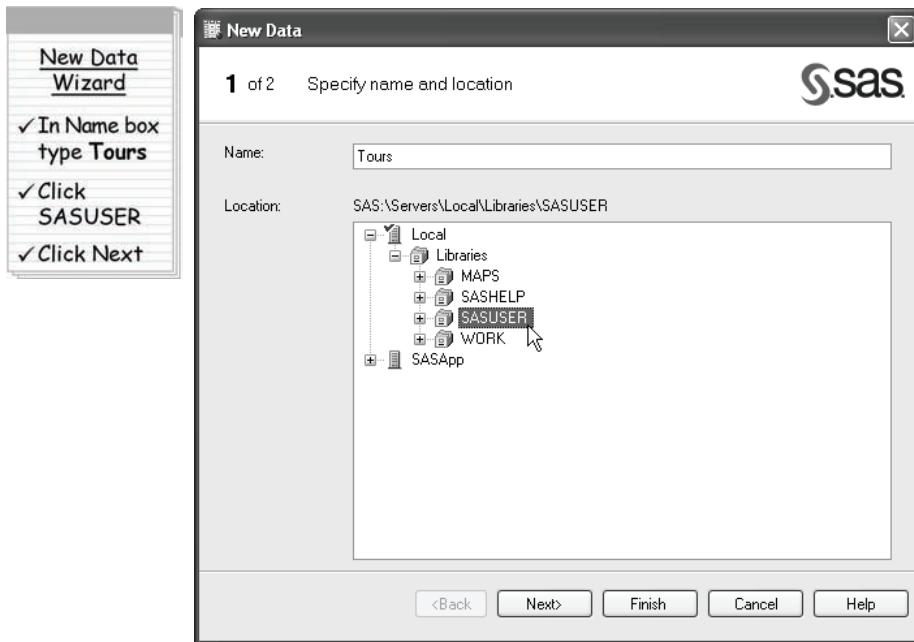
This opens the New Data wizard. In the first window of the wizard, SAS Enterprise Guide asks what you want to name the data table and where you want to save the data you are about to type. Initially, the location for the data table is set to the WORK library and the name is Data.



### SAS Data Sets or SAS Data Tables?

A SAS data set and a SAS data table are the same thing. The two terms are used interchangeably, and you will see both terms used in this book.

Give the new data table the name Tours by typing **Tours** in the **Name** box. Then, because WORK is a temporary storage location, choose an alternate library. For this example, save the data in the SASUSER library. Click **SASUSER** to select the SASUSER library. The SAS Enterprise Guide administrator at your site may have set up the SASUSER library so that you cannot save files there. If this is the case for you, choose an alternate library that is available to you.



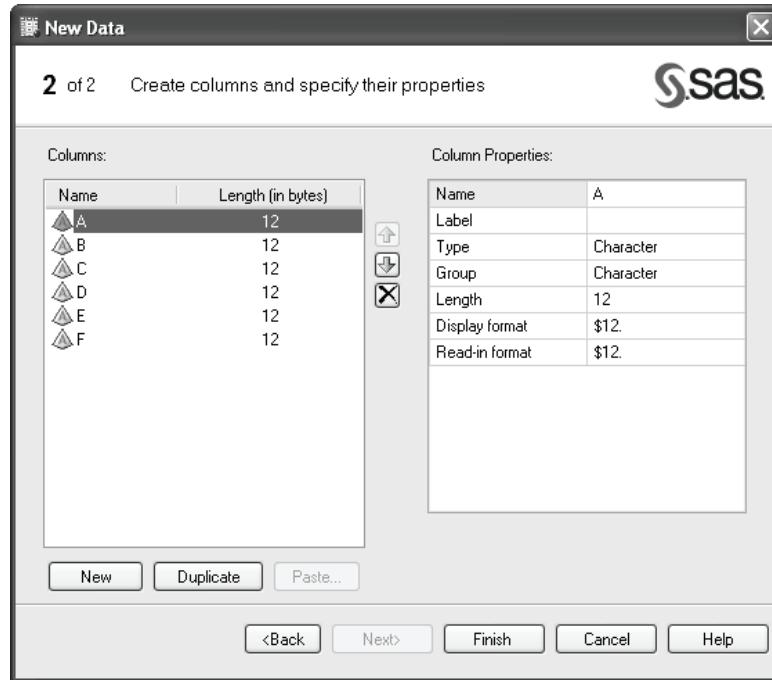
Click **Next** to open the second window of the New Data wizard.

### Libraries

SAS Enterprise Guide and SAS organize SAS data sets into libraries. Libraries are locations, or folders, where data sets are stored. Instead of referring to the folders by their full path, SAS Enterprise Guide gives the folders short nicknames, called librefs. The WORK library points to a temporary storage location that is automatically erased when you exit SAS Enterprise Guide. The SASUSER library is a permanent storage location. If the EGTASK library is defined for your site, then data sets produced by tasks will be stored in the EGTASK library. If the EGTASK library is not defined, then data sets produced by tasks will be stored in the SASUSER library. Libraries can be created using the Assign Project Library task available from the Tools menu.

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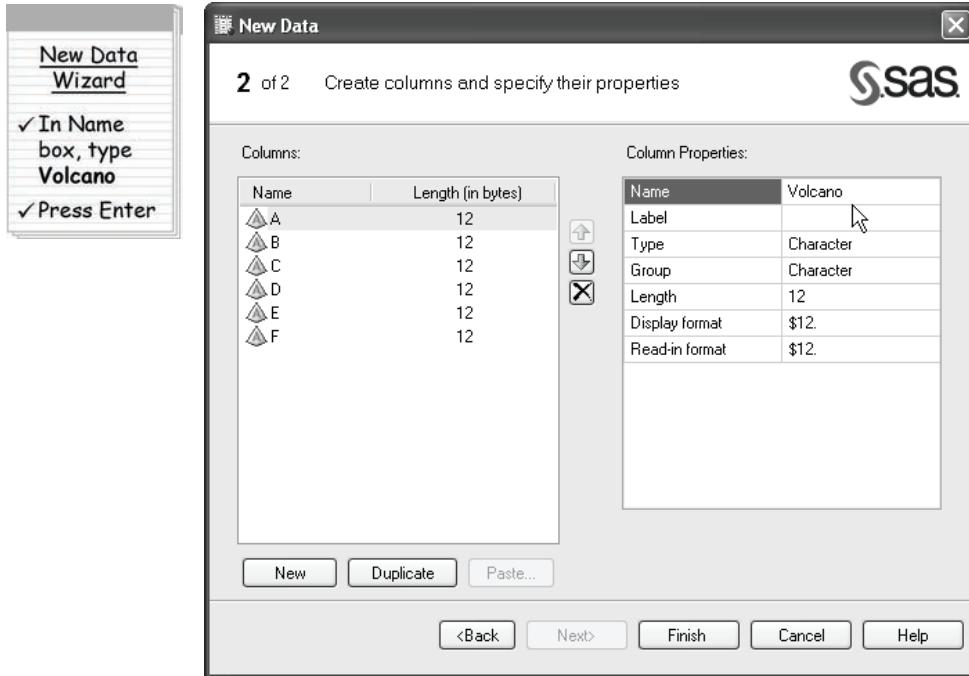
The second window of the New Data wizard is where you assign names and properties to the columns in your data table. As a starting point, the New Data wizard sets up six columns with one-letter names from A to F. All these initial columns have the same properties.



### Column Names

You can give your columns almost any names you want, but the names must be 32 characters or fewer in length. While it is possible to have special characters (including spaces) in your names, you may want to stick with just letters, numerals, and underscores. These characters are all that are allowed under the default naming rules for SAS programs. In addition, names must start with a letter or underscore. Using these rules will make it easier if you ever want to refer to your data in SAS programs that you or someone else writes.

In the Column Properties box, you can assign each column a name, label, type, group, length, display format, and read-in format. The first column will contain the names of the volcanoes, so type **Volcano** in the box next to **Name**.



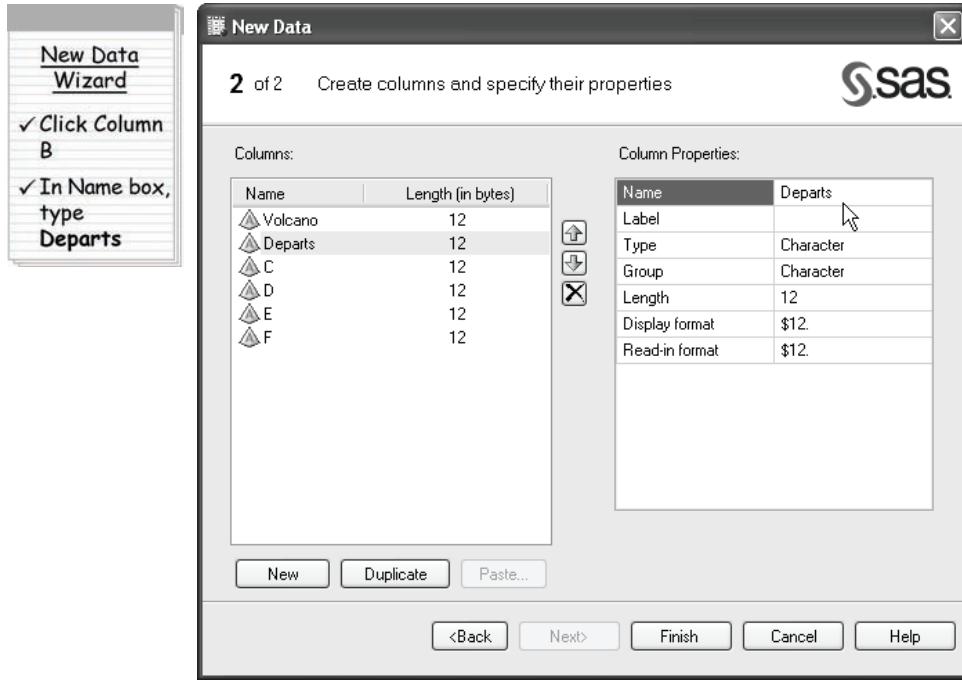
When you press **Enter**, the name you typed in the Name box will replace the name, in this case A, in the Columns box on the left. Because the names of the volcanoes contain characters, as opposed to numbers, leave the **Type** and **Group** properties as **Character**, and because none of the volcano names are longer than 12 characters, leave the **Length** set to **12**.

### Lengths of Character Columns

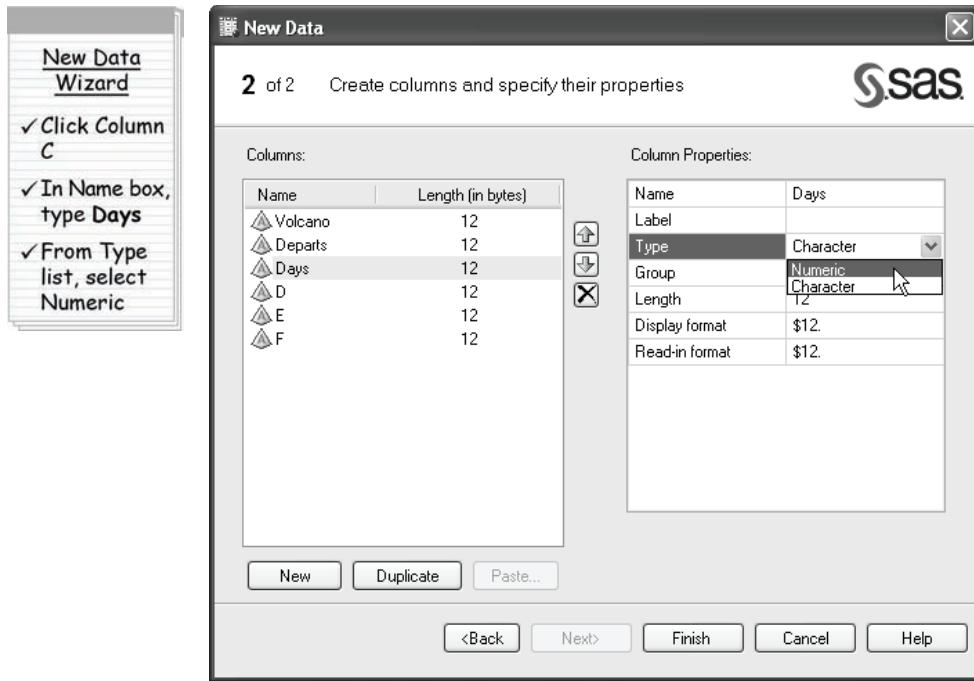
The New Data wizard in SAS Enterprise Guide gives character columns a length of 12. If your character data are longer than 12 characters, you need to change the length of the column to be at least as long as the longest data value. When you do this, you also need to change the length of the display and read-in formats to match the length of the column. If all your data values are shorter than 12 characters, you can shorten the length for the column. Using shorter lengths for character data decreases the storage space needed for the data table. If you shorten the column length, make sure you also change the display and read-in formats to the same length.

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Now click the column named **B** in the **Columns** box on the left. This column will contain the name of the departure city for the tour, so type the word **Departs** next to **Name** in the **Column Properties** box on the right. Leave the other settings as they are.

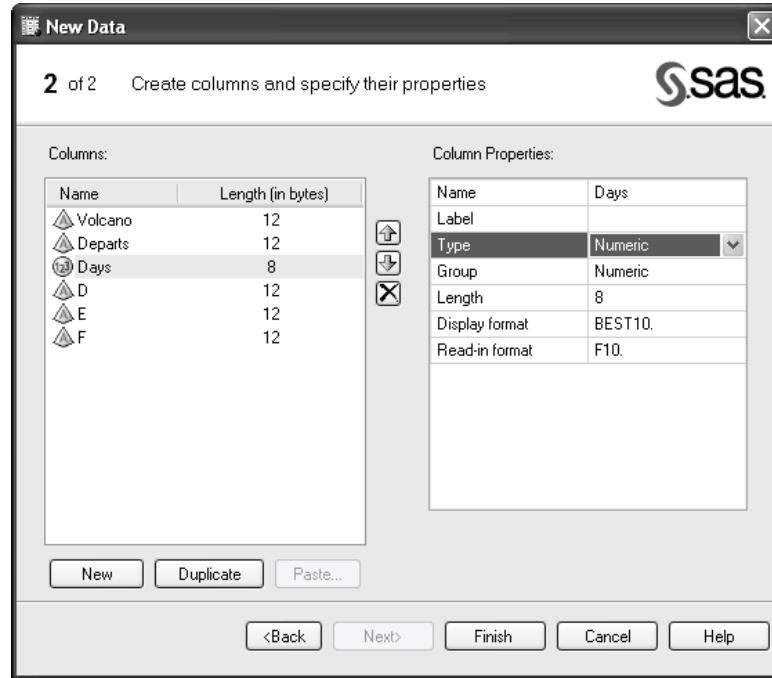


The third column contains the number of days the tour lasts. Give it the name **Days**, and because the values in this column are numbers, use the pull-down list to select **Numeric** for the **Type** property.



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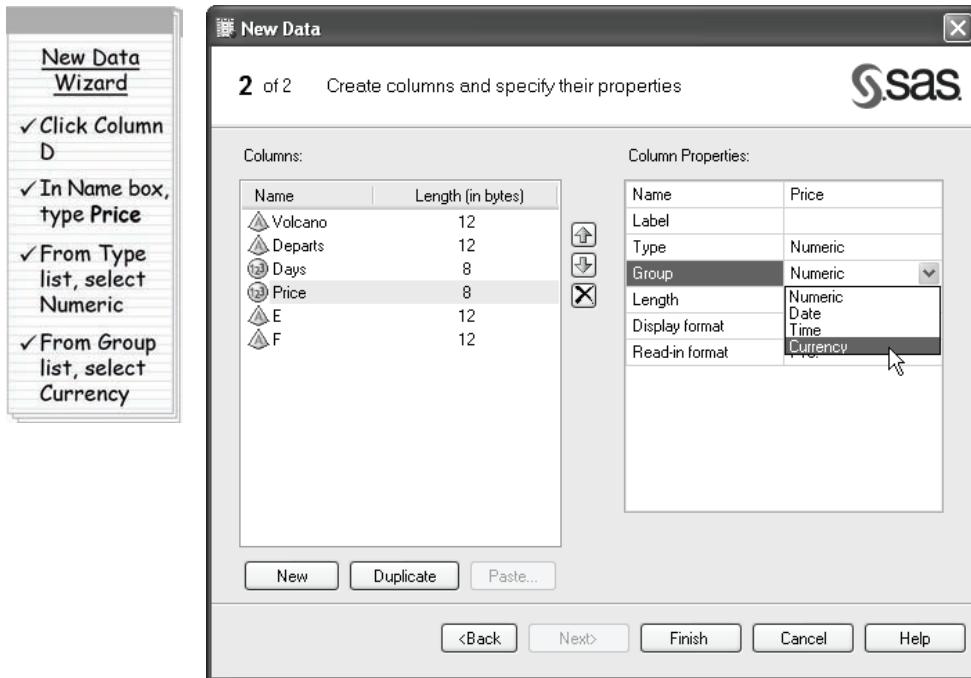
Notice that when you set the column type to numeric, the icon next to the column name changes from the red pyramid (character) to the blue ball (numeric). The length of 8 is the default for all numeric columns and means that the numbers will be stored with maximum precision. Generally, there is no need to change the length of numeric columns.



### Character versus Numeric

How do you decide if a column should be character or numeric? If the values for the column have letters or special characters in them, then the column must be character. If the column contains only numerals, then it could be either character or numeric. Generally, if it does not make sense to add or subtract the values, then the column should be character.

Name the fourth column **Price** and give it the type **Numeric**. When you choose the numeric type, you have several options for **Group**: numeric, date, time, and currency. Because Price will contain currency values, select the group **Currency**.

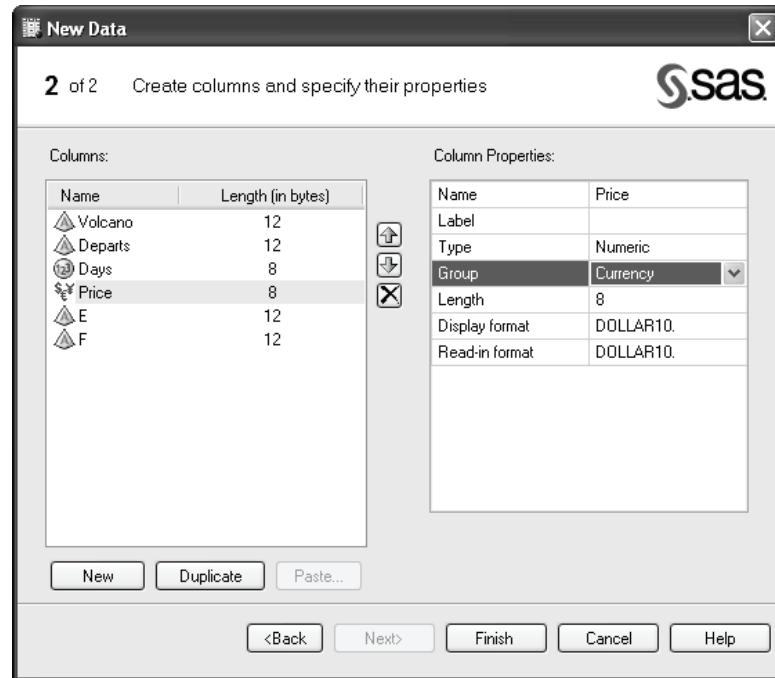


### Numeric Groups

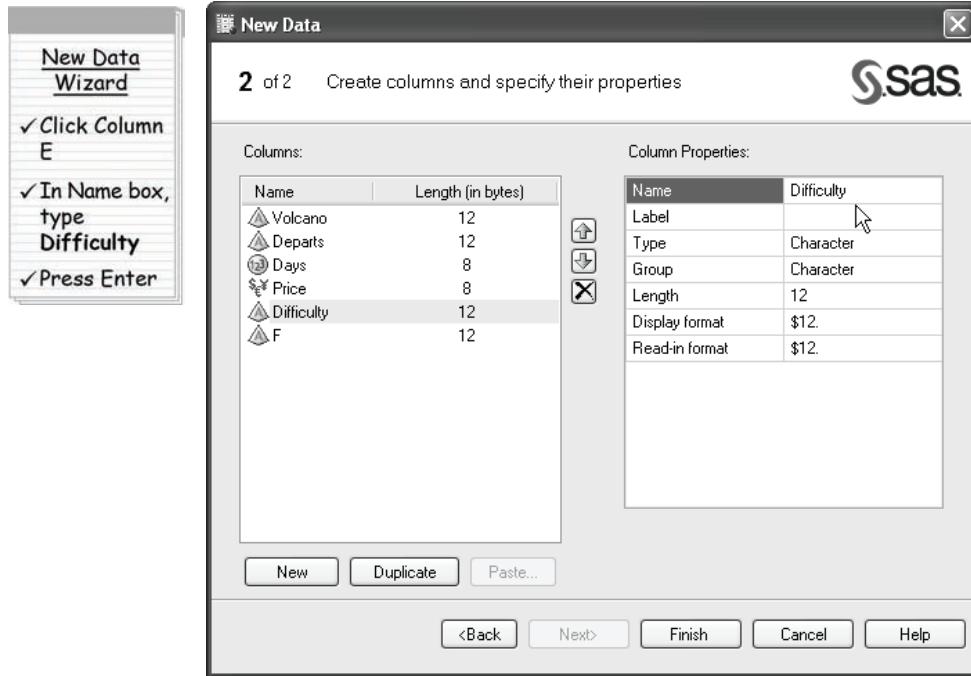
By choosing a group for your numeric column, what you are doing is assigning your column a format. A format is a way of displaying the values in the column. If you choose currency, then when you type a number like 1200, SAS Enterprise Guide will automatically display the number as \$1,200. SAS Enterprise Guide has made it easy for you to assign some of the frequently used formats to your columns.

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Notice that when you do this, the icon changes from the blue ball to the currency icon

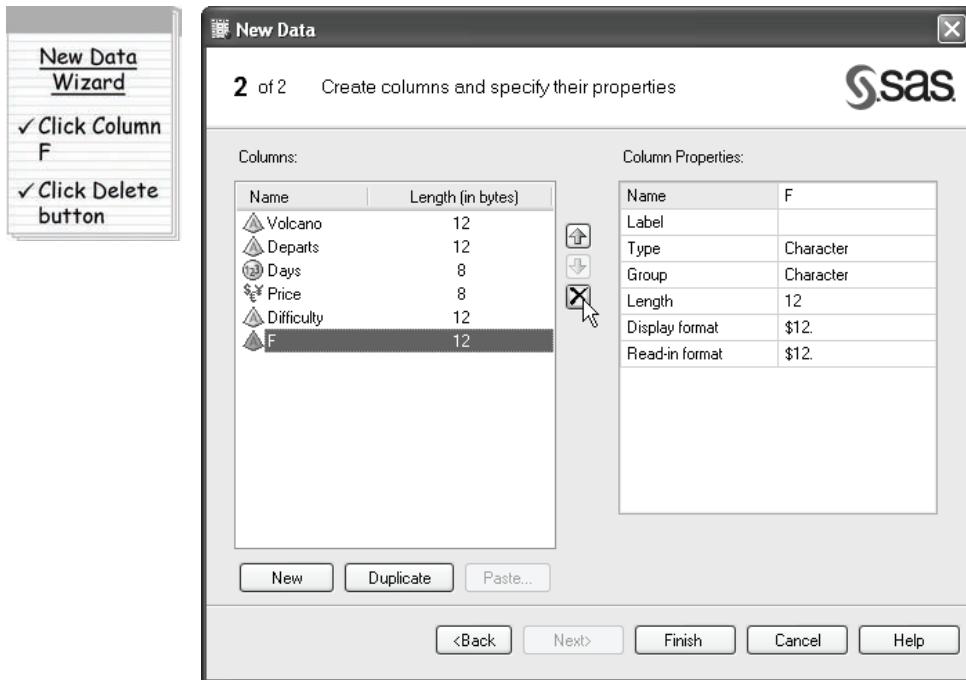


The final column will contain the difficulty ratings of each tour. The most challenging tours have values of **c**, the moderately challenging tours have values of **m**, while the easiest tours have values of **e**. Give the column the name **Difficulty** and select **Character** as the type.

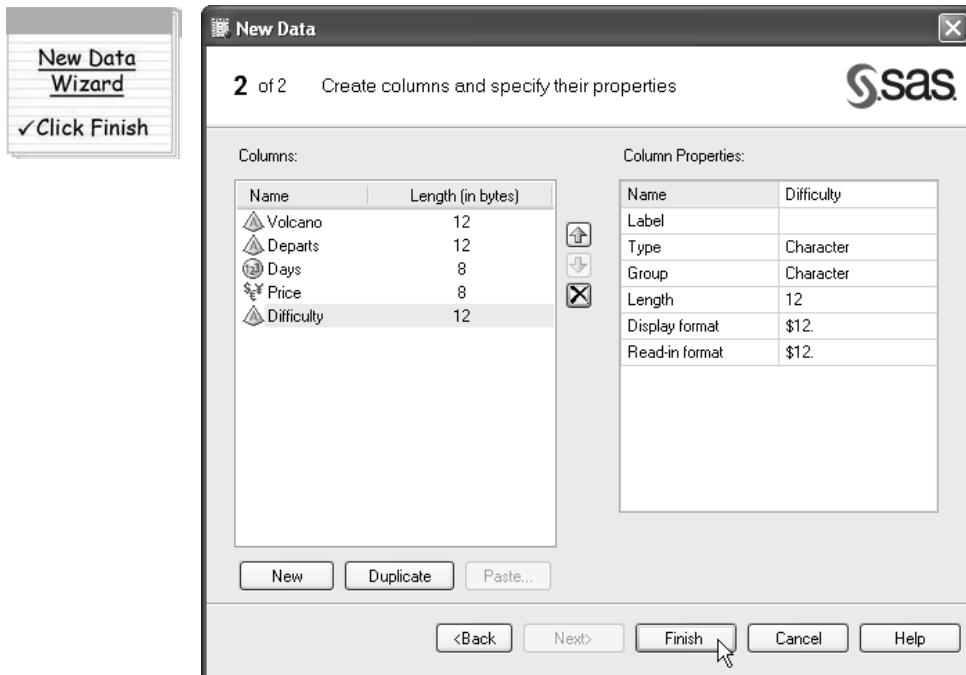


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Now the properties for all the columns have been set. However, there is one extra column: column F. Delete the unnecessary column by clicking it in the **Columns** box and then clicking the delete button  to the right of the **Columns** box.



Now all the columns have been given names and properties, and there are no extra columns.



Click **Finish** to create the new data table. The Tours data table appears in a Data Grid in the workspace with all the columns that you just defined. There is also an icon for the Tours data table in the Project Tree under the words Process Flow.

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Notice that the numeric columns, Days and Price, have periods in the data cells. This is because in SAS Enterprise Guide missing numeric values are represented by a single period, whereas missing character values are represented by blanks. Because no data have been entered into the Data Grid, all the values are missing.

The screenshot shows the SAS Enterprise Guide interface. On the left, there is a Project Tree window containing a node named 'TOURS'. Below it is a Server List window showing connections to 'Servers', 'OLAP Servers', and 'Private OLAP Servers'. The main workspace contains a Data Grid titled 'TOURS' with 12 rows labeled 1 through 12. The columns are 'Volcano', 'Departs', 'Days', 'Price', and 'Difficulty'. All cells in the 'Days' and 'Price' columns contain a single decimal point ('.') representing missing numeric values. The 'Volcano' and 'Departs' columns contain blank character values. The 'Difficulty' column contains values ranging from 1 to 5.

	Volcano	Departs	Days	Price	Difficulty
1			.	.	
2			.	.	
3			.	.	
4			.	.	
5			.	.	
6			.	.	
7			.	.	
8			.	.	
9			.	.	
10			.	.	
11			.	.	
12			.	.	

You can now start entering the data into the Data Grid. To enter data into the Data Grid, simply click a cell and start typing the data. Click the first cell in the **Volcano** column and type the volcano name **Etna**.

	Volcano	Departs	Days	Price	Difficulty
1	Etna				
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

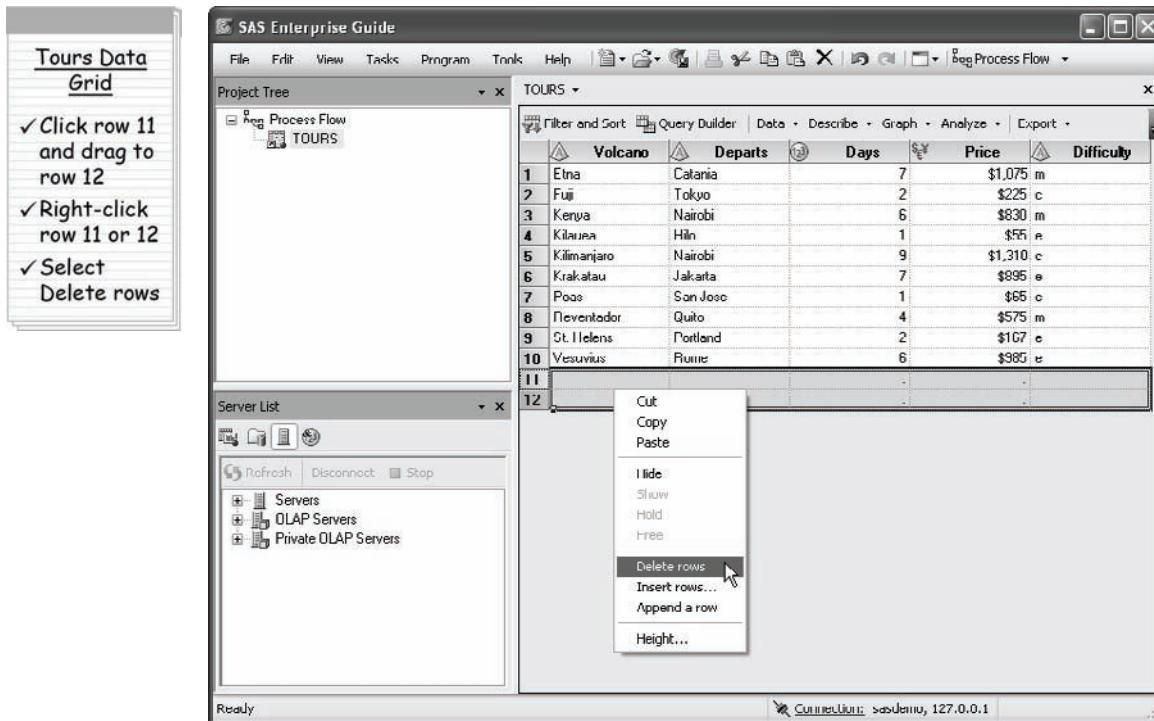
To move over to the next column, press the **Tab** key. To move down to the cell below, press the **Enter** key. You can also use the arrow keys to move around in the Data Grid, or you can simply click the cell where you want to type. Enter all the data for the volcano tours so that your Data Grid looks like the following. Notice that when you enter the data for the Price column, you do not need to enter the dollar signs and commas. Simply enter the numerals that make up the number, and then when you move on to another cell, SAS Enterprise Guide will give your number the proper formatting.

	Volcano	Departs	Days	Price	Difficulty
1	Etna	Catania	7	\$1,075	m
2	Fuji	Tokyo	2	\$225	c
3	Kenya	Nairobi	6	\$830	m
4	Kilauea	Hilo	1	\$55	e
5	Kilimanjaro	Nairobi	9	\$1,310	c
6	Krakatau	Jakarta	7	\$895	e
7	Poas	San Jose	1	\$65	e
8	Reventador	Quito	4	\$575	m
9	St. Helens	Portland	2	\$167	e
10	Vesuvius	Rome	6	\$985	e
11					
12					

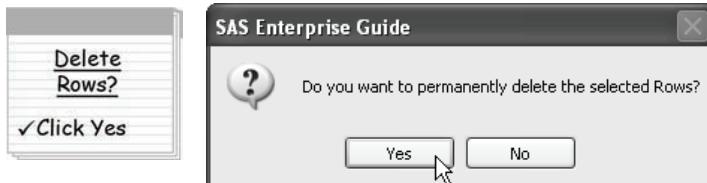
If you need to go back and make any changes, just click the cell and make the necessary changes.

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By default, SAS Enterprise Guide provides 12 rows for data entry. If you have more than 12 rows of data, then you can press the **Enter** key from any cell in the last row and SAS Enterprise Guide will automatically generate a new blank row for you. Because there are only 10 tours in this data file, you will need to delete the two extra blank rows. If you don't delete the blank rows, then all the values for those rows will be missing and these missing values will appear in any report or analysis you perform. Highlight both blank rows by clicking row 11 and dragging the cursor to row 12. Then right-click one of the rows and select **Delete rows**.



Confirm that you want to delete the rows by clicking **Yes** in the pop-up dialog box.



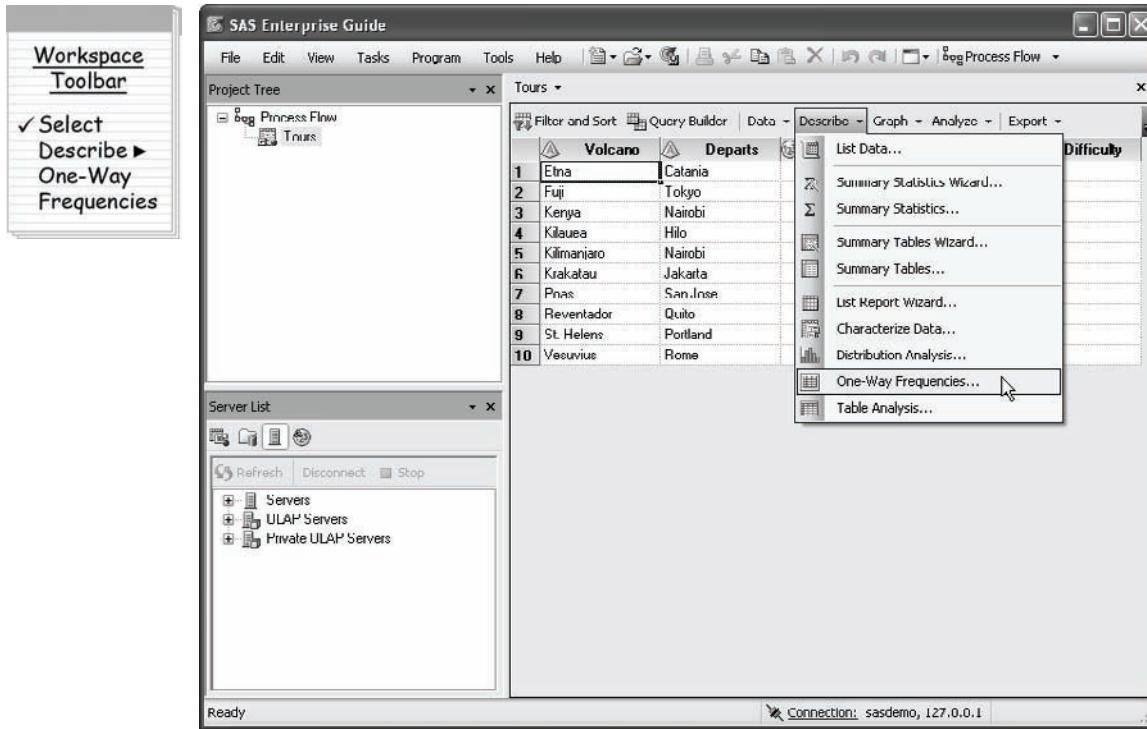
Now the Data Grid is completely filled without any extra rows or columns.

The screenshot shows the SAS Enterprise Guide interface with the following components:

- Project Tree:** Shows a single node named "TOURS".
- Server List:** Shows a tree structure with three main categories: Servers, OLAP Servers, and Private OLAP Servers. Under Servers, there is one entry.
- Data Grid:** Titled "TOURS", it displays 10 rows of data with the following columns: Volcano, Departs, Days, Price, and Difficulty. The data is as follows:

	Volcano	Departs	Days	Price	Difficulty
1	Etna	Catania	7	\$1,075	m
2	Fiji	Tokyo	2	\$225	c
3	Kenya	Nairobi	6	\$830	m
4	Kilauea	Hilo	1	\$55	e
5	Kilimanjaro	Nairobi	9	\$1,310	c
6	Krakatau	Jakarta	7	\$895	e
7	Poas	San Jose	1	\$65	c
8	Reventador	Quito	4	\$575	m
9	St. Helens	Portland	2	\$107	e
10	Vesuvius	Rome	6	\$385	e

**Creating a frequency report** To create a simple frequency report that will show the number of easy, moderate, and challenging tours, use the One-Way Frequencies task. Select **Describe ▶ One-Way Frequencies** from the workspace toolbar located just above the data.



### Opening Tasks and Wizards

You can open tasks by selecting them from the workspace toolbar of a Data Grid, the **Tasks** item on the menu bar, or the Task List window. Use whichever method feels more comfortable for you. In the tutorials, we describe how to open tasks using the workspace toolbar. But it's fine if you want to use the Task List or menu item instead.

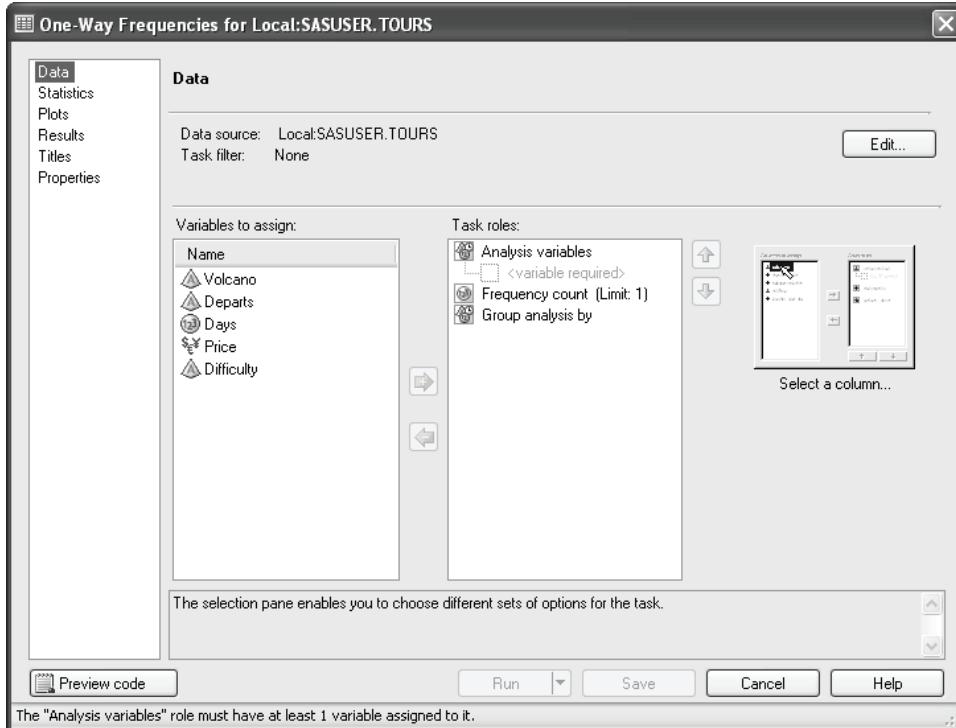
Some tasks have wizards in addition to the regular task window. A wizard guides you through the task one window at a time and gives access to many of the features of the task. Not all tasks have wizards, but if a task does have a wizard, it will be listed next to the task in the pull-down list.

Because the data have just been entered into the Data Grid, the following dialog box appears.



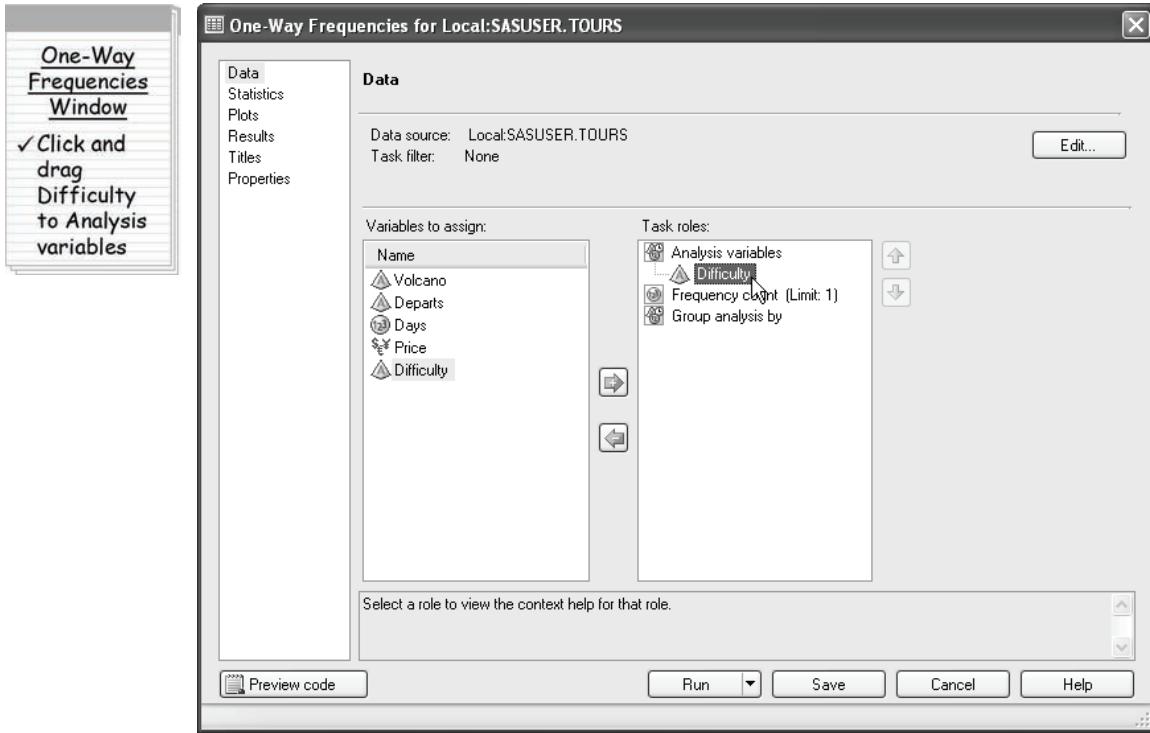
Data must be protected before you can perform any task on your data. Protecting the data ensures that the data cannot be accidentally changed. If your data are not protected, SAS Enterprise Guide will prompt you. Click **Yes**.

This opens the One-Way Frequencies task window, which has six pages: Data, Statistics, Plots, Results, Titles, and Properties. When you first open the task, the Data page will be displayed. All six pages for the task are listed in the selection pane on the left, with the displayed page highlighted.



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For most tasks that you perform in SAS Enterprise Guide, you will need to assign variables to roles. To produce a report with the number of tours in each category of the variable **Difficulty**, click the variable **Difficulty** and drag it to the **Analysis variables** role.

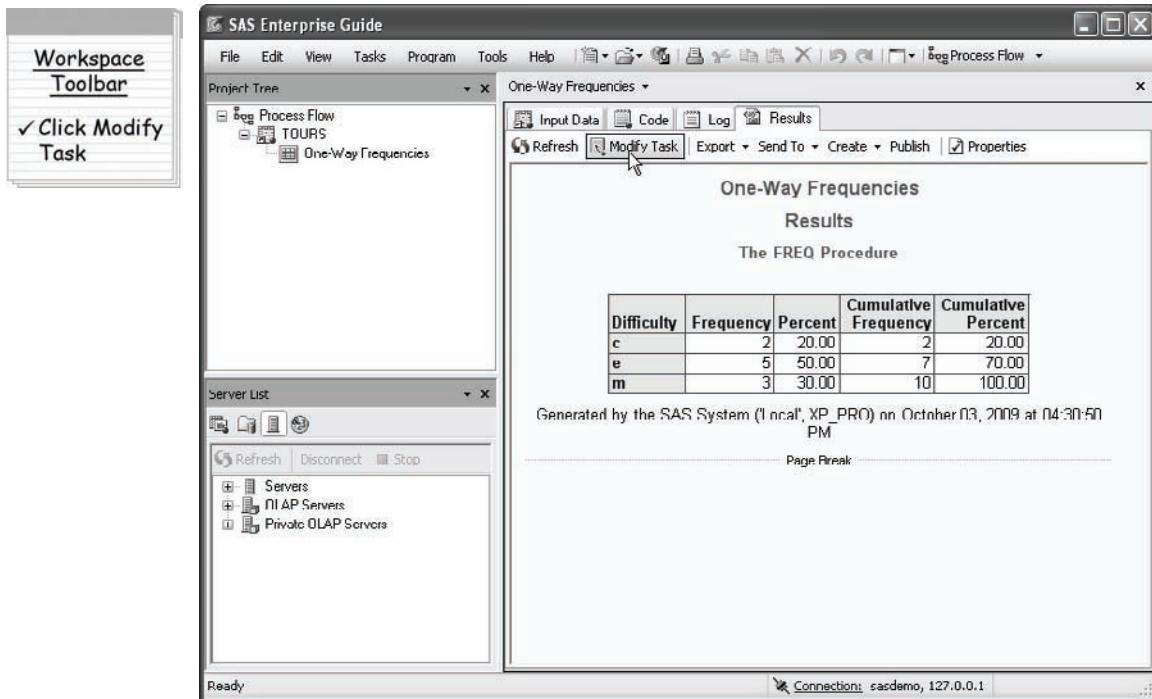


Click **Run** to run the task and produce your report.

**Columns or Variables?**

A column and a variable are the same thing. The two terms are used interchangeably, and you will see both terms used in SAS Enterprise Guide. For example, the One-Way Frequencies task uses the term "variable," while the Scatter Plot task uses the term "column." Just remember, a variable is a column, and a column is a variable.

The results from the task appear in the workspace on the Results tab. Along with the Results tab, the task has also generated an Input Data tab, a Code tab, and a Log tab. The Input Data tab contains the data used in the task. The Code tab shows the SAS code generated by the task, and the Log tab shows the code along with any messages SAS produced while running the task. The results show that two tours are challenging, five are easy, and three are moderate.



Difficulty	Frequency	Percent	Cumulative Frequency	Cumulative Percent
c	2	20.00	2	20.00
e	5	50.00	7	70.00
m	3	30.00	10	100.00

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Page Break

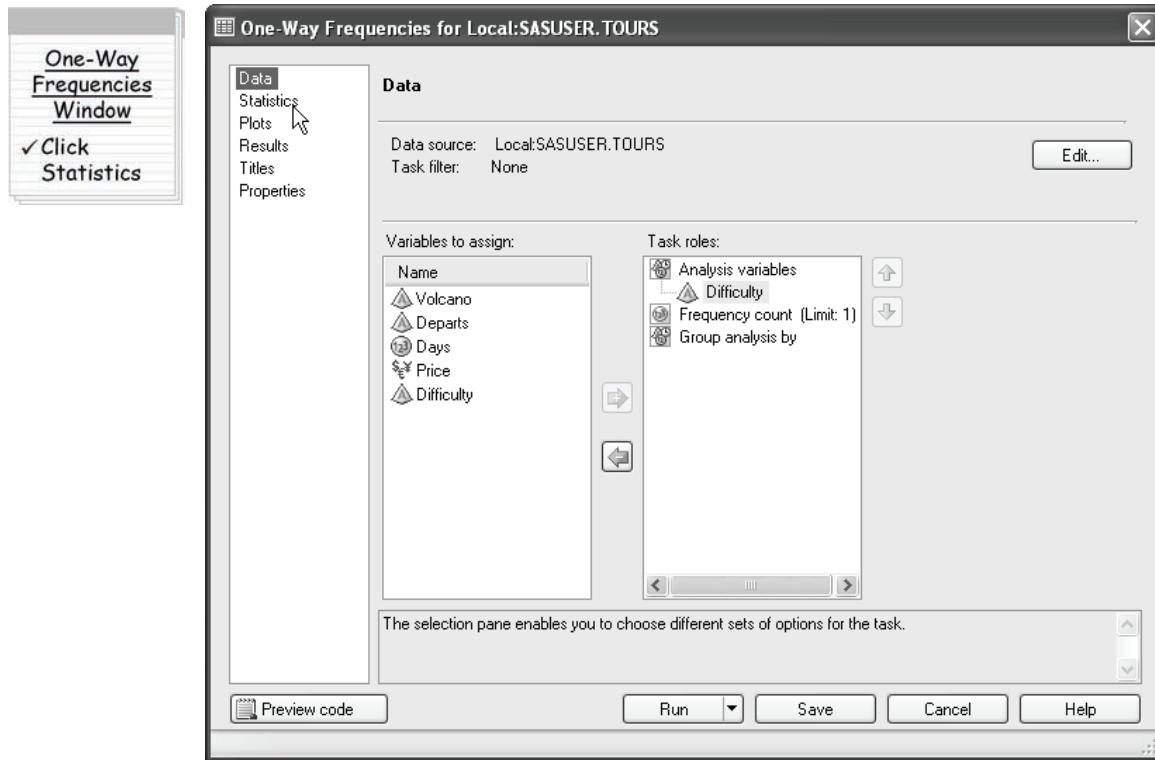
To make changes to the task and modify the results, click **Modify Task** on the workspace toolbar to reopen the task. This reopens the One-Way Frequencies task.

### Workspace Toolbar

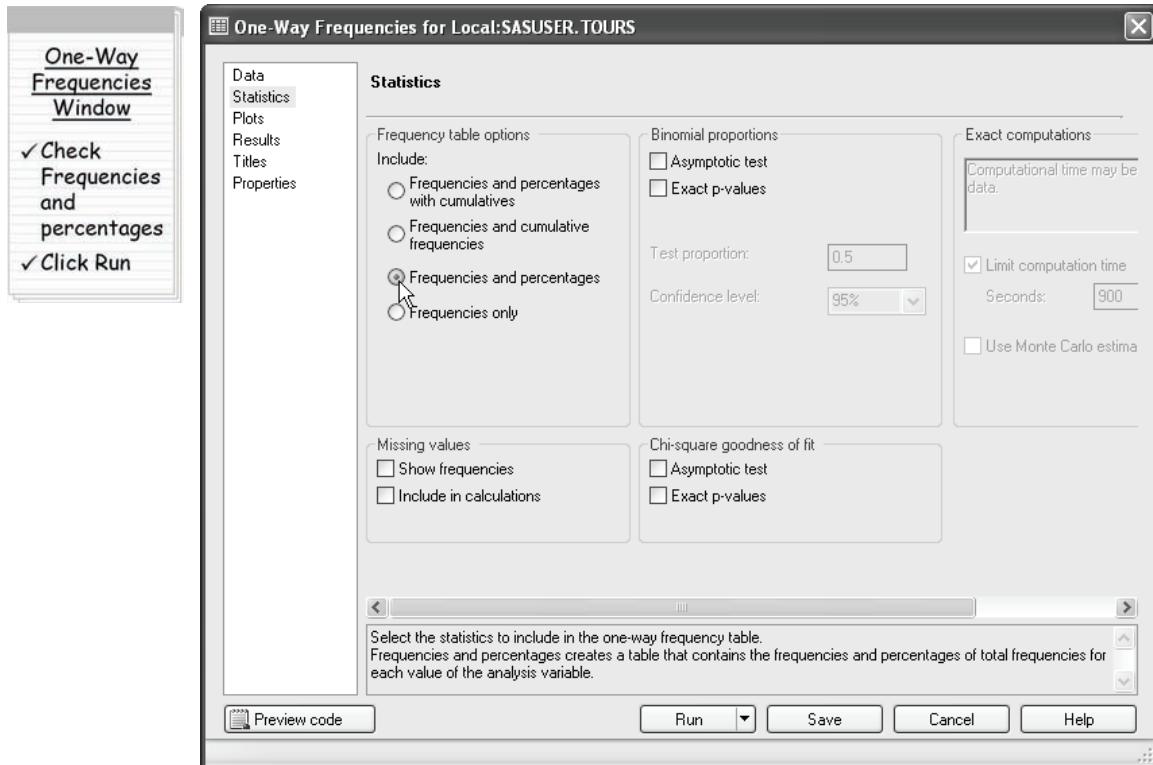
The workspace toolbar gives you quick access to many features you might want when viewing a particular item in the workspace. For example, the **Modify Task** button appears on the toolbar when you are viewing the results, log, or code for a task.

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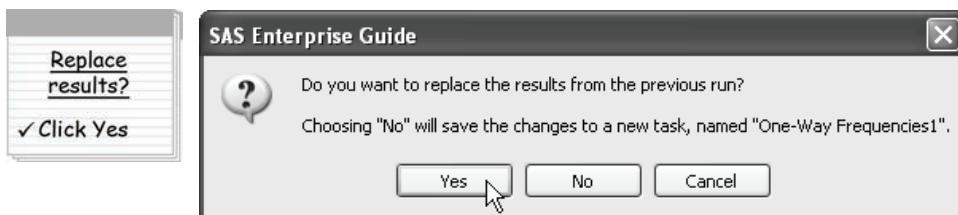
Notice that when you reopen the task, all the choices you made are still there. For this example, we are going to remove the cumulative statistics from the table, so click **Statistics** in the selection pane on the left to open the Statistics page.



There are many options in the Statistics page. In the area labeled **Frequency table options**, you can choose which frequencies and percentages will appear in the table. By default, frequencies, percentages, cumulative frequencies, and cumulative percentages will appear in the table. To exclude the cumulative statistics, check **Frequencies and percentages**.



Rerun the task by clicking the **Run** button at the bottom of the window. When you do this, SAS Enterprise Guide gives you a choice. You can either replace the results that you generated the last time you ran the task, or you can create new results.



In this case, there is no reason to keep the old results, so click **Yes**.

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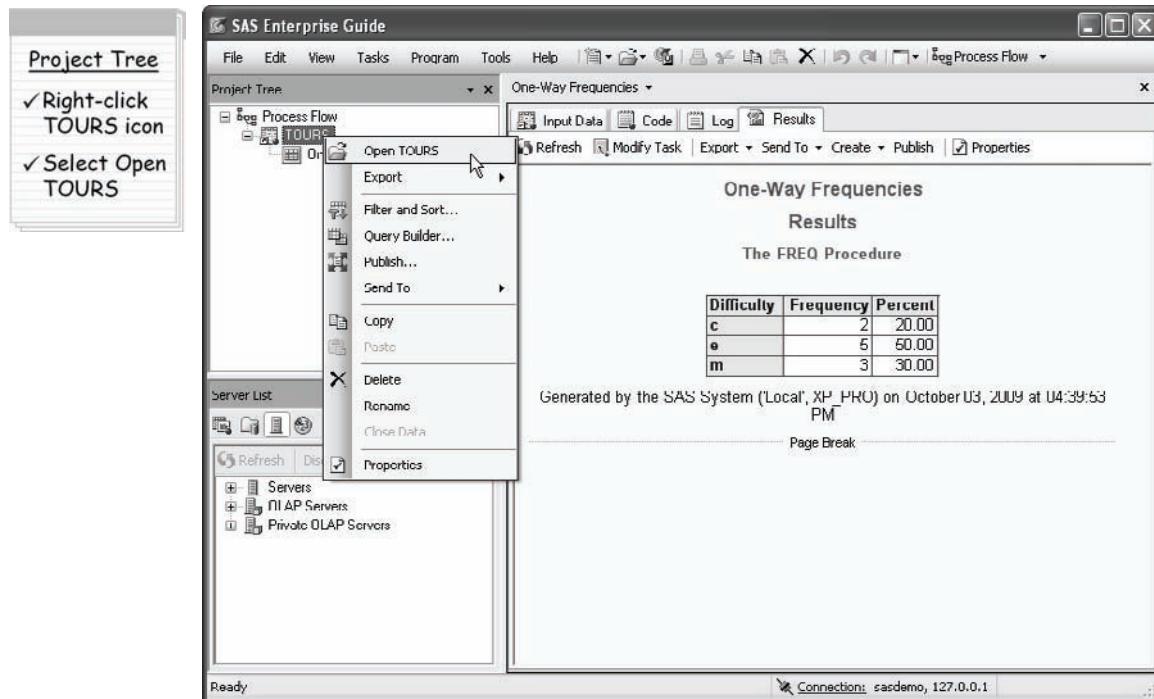
Here are the results that will appear in the workspace showing just the frequencies and percentages without the cumulative statistics.

One-Way Frequencies		
Results		
The FREQ Procedure		
Difficulty	Frequency	Percent
c	2	20.00
e	5	50.00
m	3	30.00

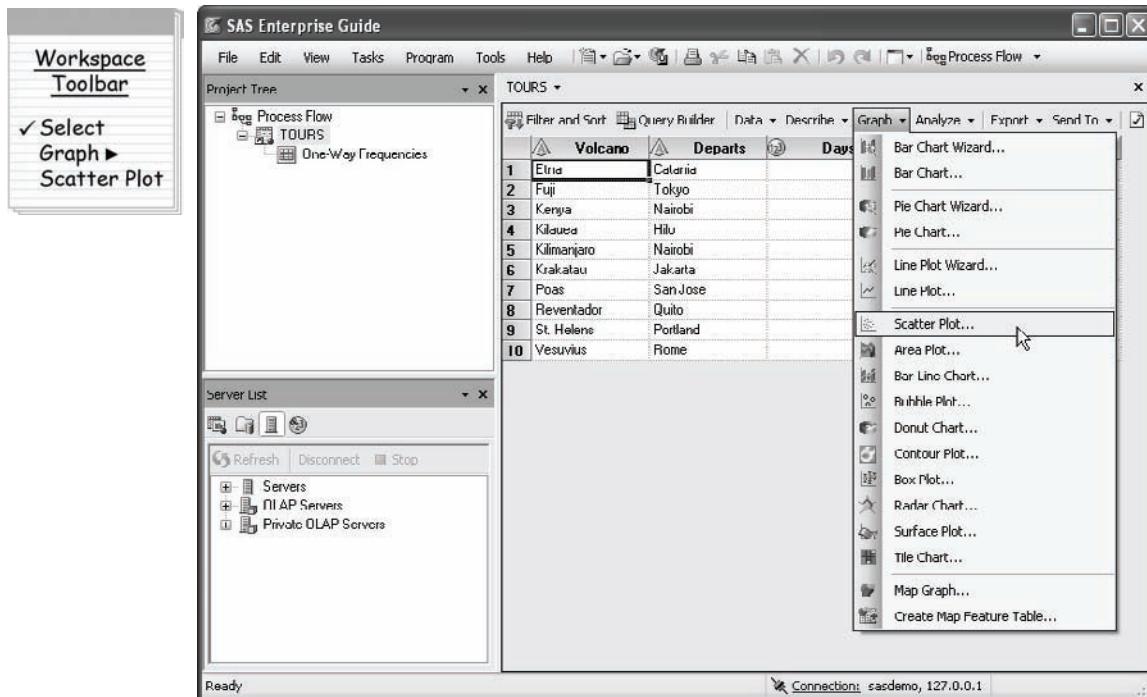
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Page Break

**Creating a scatter plot** To generate a scatter plot of the data, you will need to use a different task. First reopen the Tours data set to display the data. Right-click the TOURS data set icon in the Project Tree and select **Open TOURS**.



With the Tours data set open in the workspace, the workspace toolbar now shows menu items that apply to data. Select **Graph ▶ Scatter Plot**.

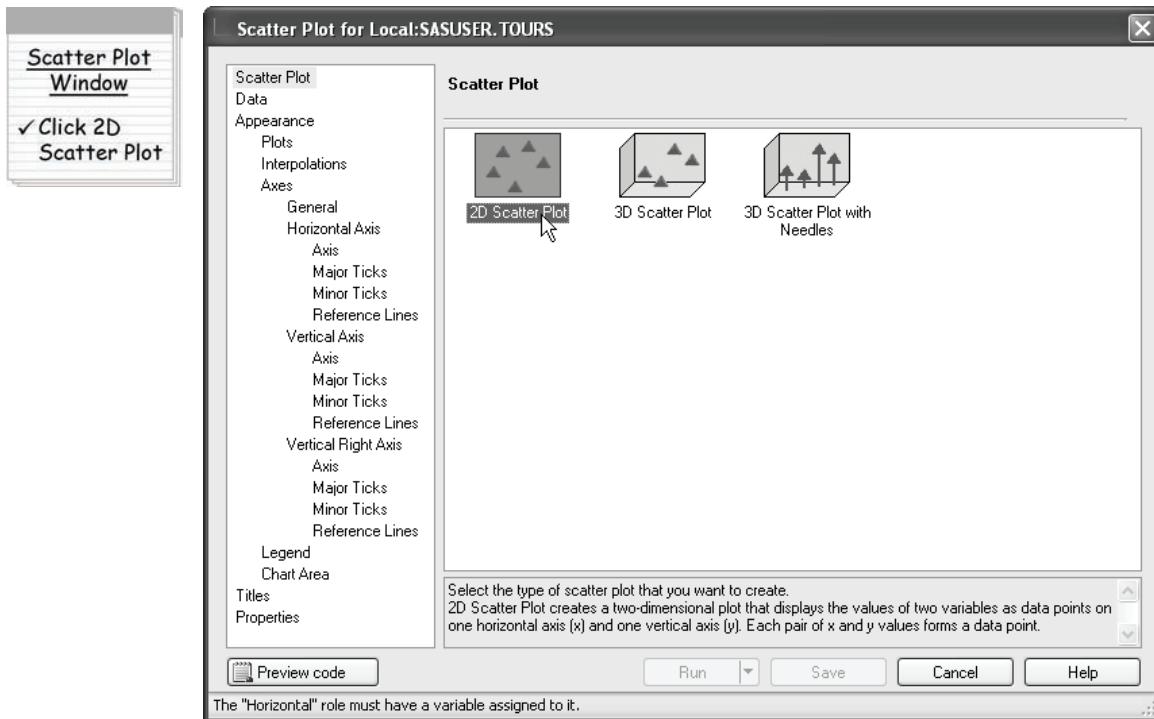


### Opening Data Tables in the Workspace

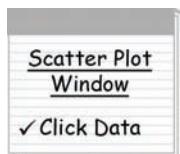
There are several ways to display data tables in the workspace. You can right-click the data table icon in the Project Tree or Process Flow and select Open. You can double-click the data table icon in the Project Tree or Process Flow. Or, if you have run a task using the data, you can click the **Input Data** tab in the workspace to view the input data for the task.

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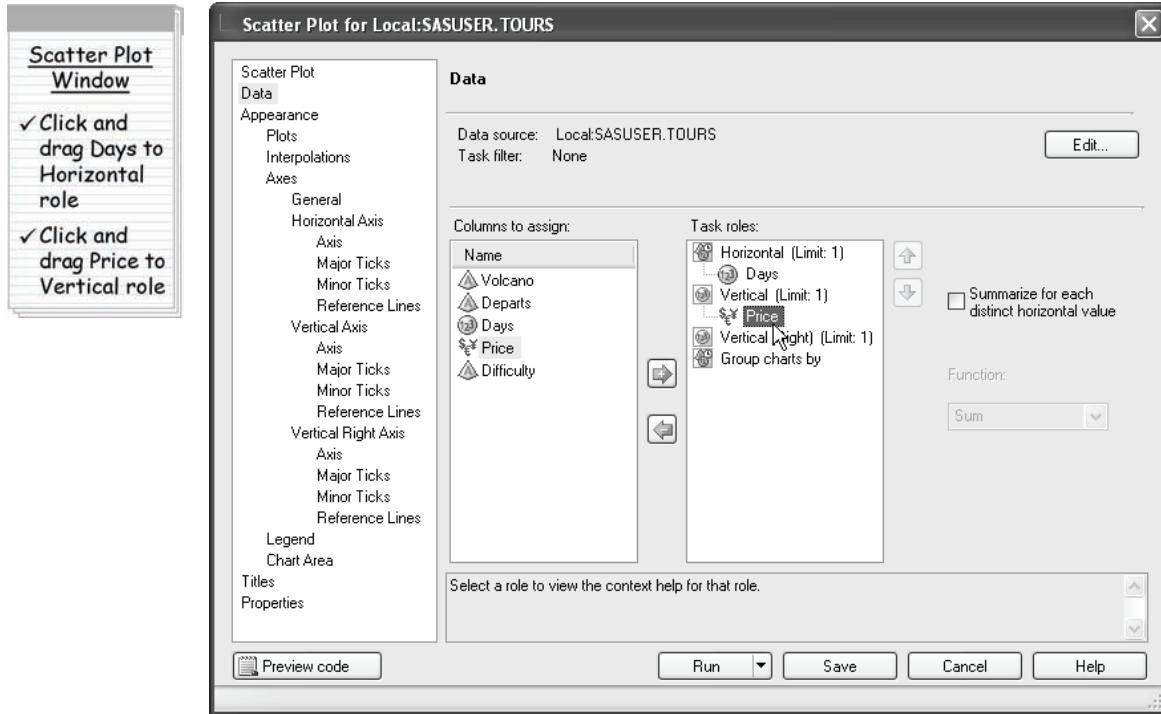
This opens the Scatter Plot window. Before assigning roles to columns, you need to choose the type of scatter plot to produce. A simple two-dimensional scatter plot is appropriate for this report, so click **2D Scatter Plot**.



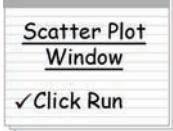
Next, click **Data** in the selection pane on the left to assign columns to roles.



For this plot, the column Days should be on the horizontal axis, and the column Price on the vertical axis. So, click **Days** and drag it to the **Horizontal** task role, and click **Price** and drag it to the **Vertical** task role.

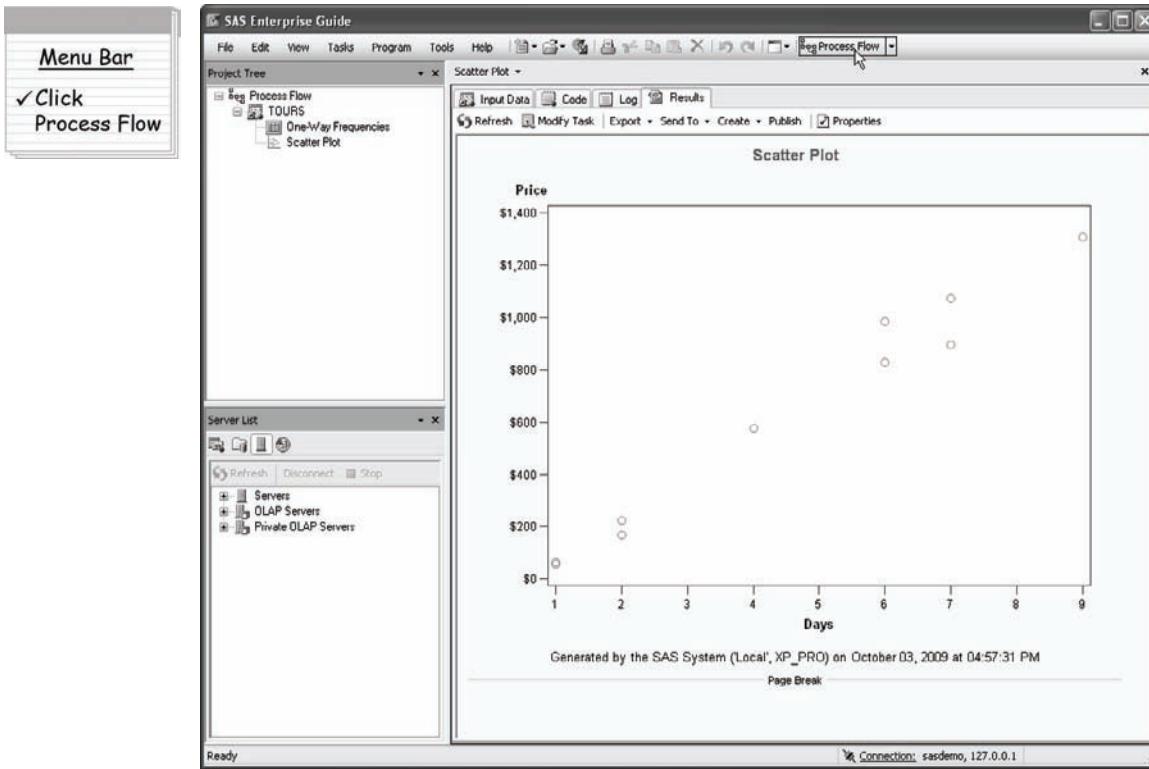


The Scatter Plot task has many groups of options, but to produce a simple plot, there is no need to change anything else. Click **Run**.



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Here are the results of the Scatter Plot task that appear in the workspace.

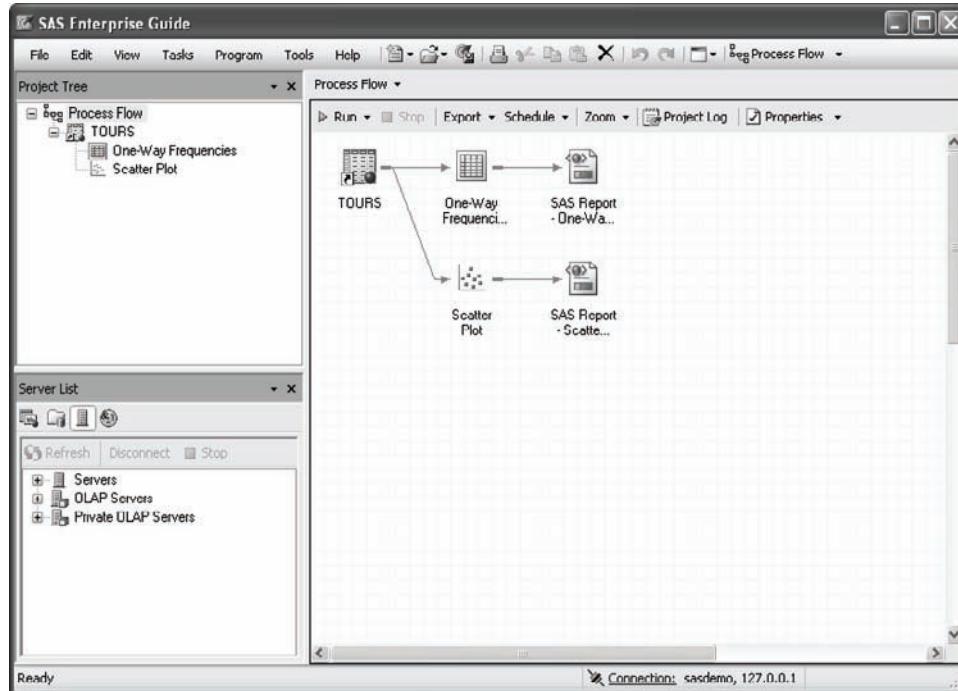


Now click **Process Flow** on the menu bar and take a look at the Process Flow.

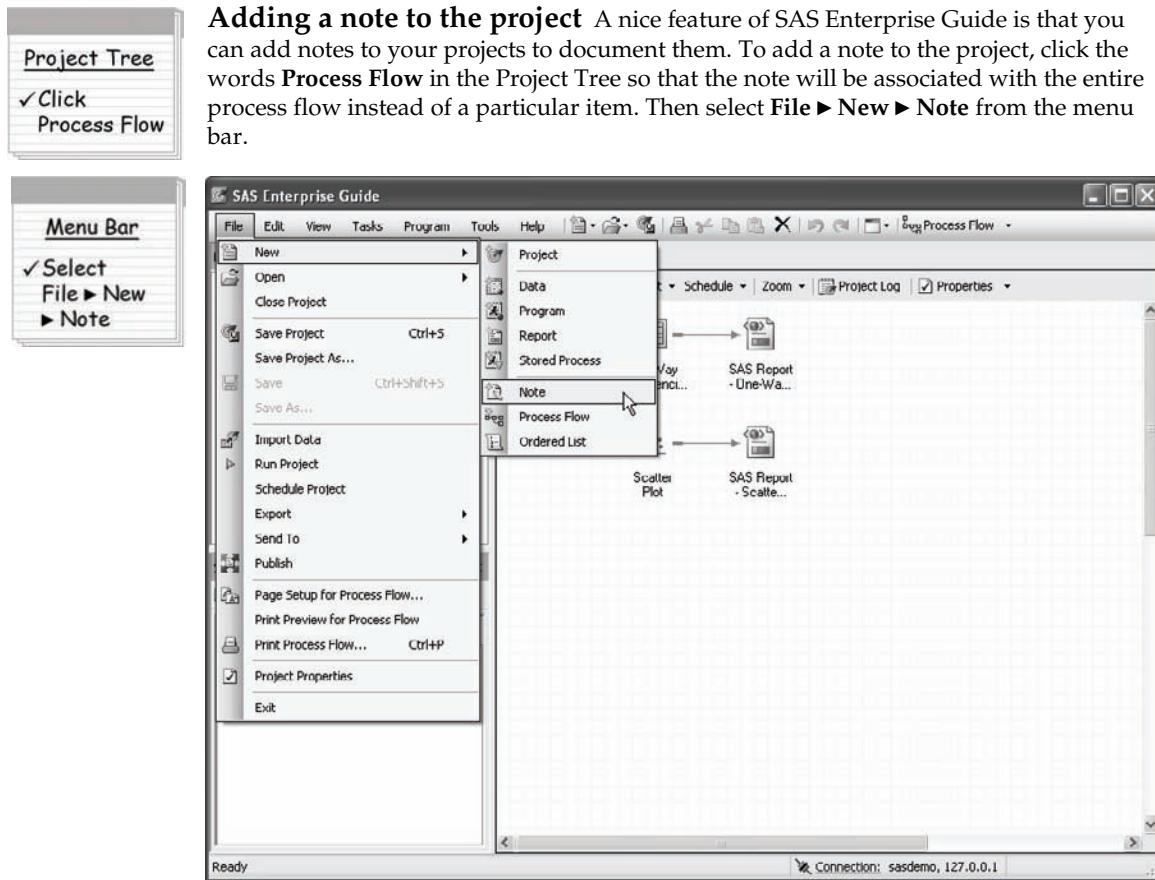
#### Displaying the Process Flow

There are several ways to display the Process Flow in the workspace. You can select it from the Process Flow drop-down list on the menu bar, double-click its name in the Project Tree, select it from the View menu, select it from the drop-down list located above the workspace but below the main toolbar, or press F4.

Both the Project Tree and the Process Flow show the various parts of your project and how they are related. In the Process Flow, you can see that there are two arrows coming from the Tours data set. There is an arrow for the One-Way Frequencies task and one for the Scatter Plot task. Each task produces a report. The Process Flow makes it easy to see how the different parts of the project are related.

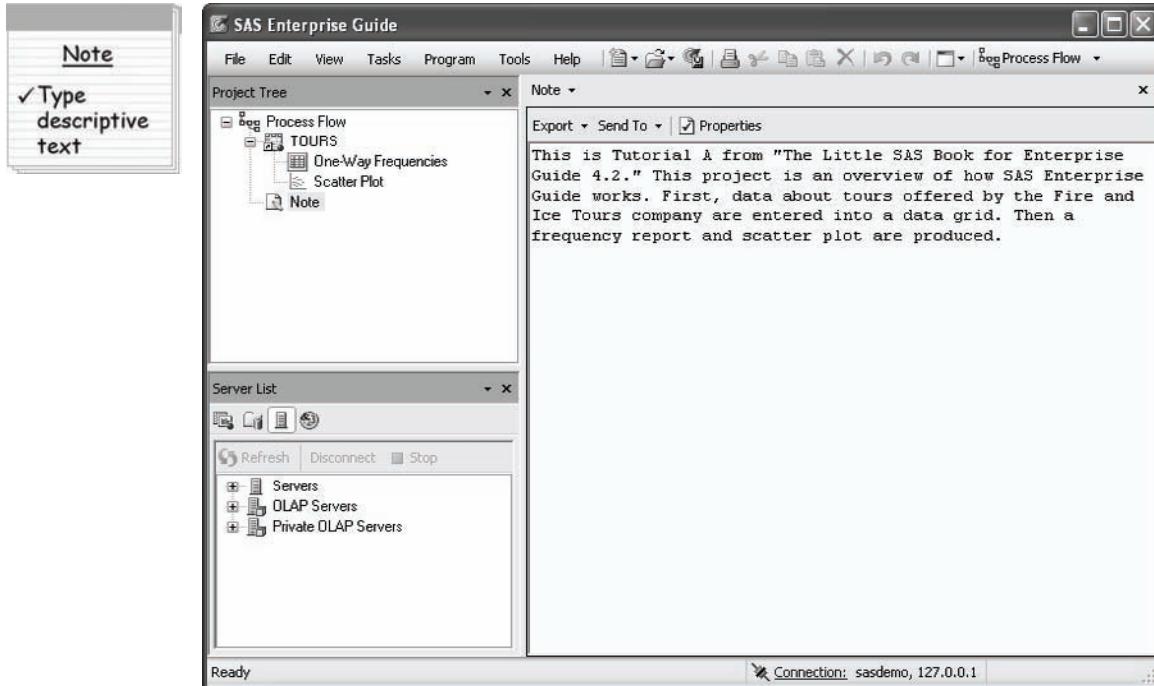


An alternate view of your project can be found in the Project Tree. The Project Tree displays the same elements as the Process Flow, except they are arranged in a hierarchical tree diagram. The Project Tree is always visible, but since the Process Flow is in the workspace, it sometimes gets displaced by other items.

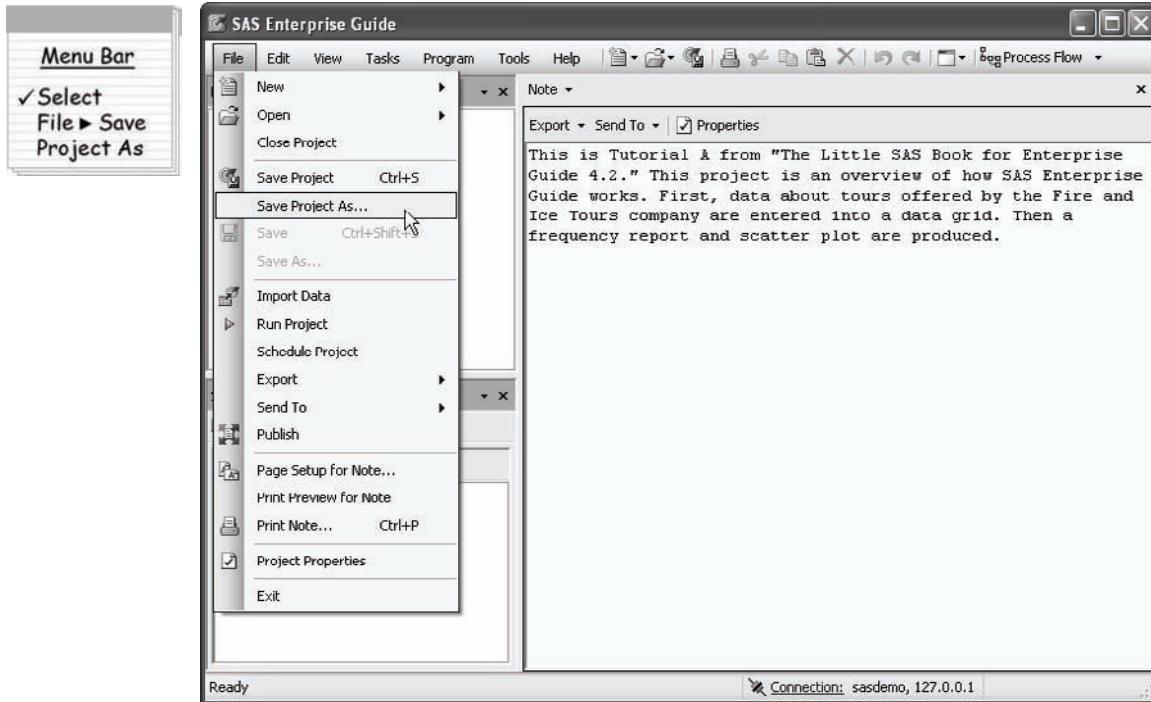


**Adding a note to the project** A nice feature of SAS Enterprise Guide is that you can add notes to your projects to document them. To add a note to the project, click the words **Process Flow** in the Project Tree so that the note will be associated with the entire process flow instead of a particular item. Then select **File ▶ New ▶ Note** from the menu bar.

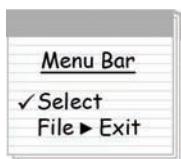
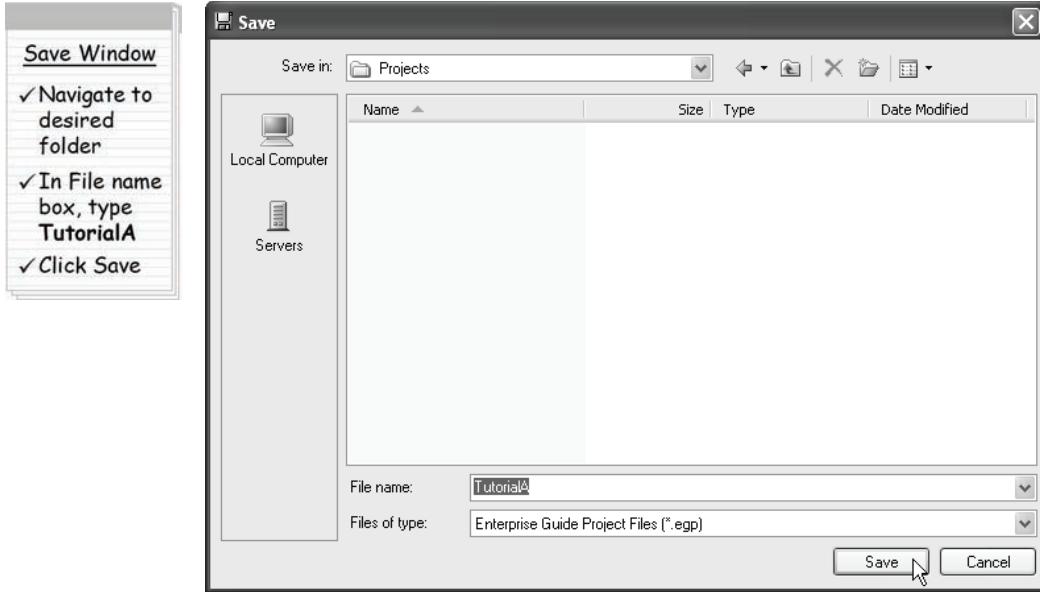
Enter a brief description of the project in the Note window that appears in the workspace.



**Saving the project** SAS Enterprise Guide will always ask if you want to save any changes before allowing you to exit. Of course, you can save your work at any time before exiting. All the tasks created in your project, along with the results and any notes, are saved in the project. The data files are saved outside the project file—only the shortcuts to the data files are saved in the project. To save the project, select **File ▶ Save Project As** from the menu bar.



Navigate to the location where you want to save the project. Give the project the filename **TutorialA** and click **Save**.



Now you can exit SAS Enterprise Guide and all your work and data will be saved. From the menu bar, select **File ▶ Exit** to exit SAS Enterprise Guide and complete the first tutorial.

- Save Window
  - ✓ Navigate to desired folder
  - ✓ In File name box, type **TutorialA**
  - ✓ Click Save

- Menu Bar
  - ✓ Select **File ▶ Exit**

B

“ The obvious is that which  
is never seen until someone  
expresses it simply. ”

KAHLIL GIBRAN

From *Sand and Foam: A Book of Aphorisms*, 1926.

## B ▶ Creating Reports

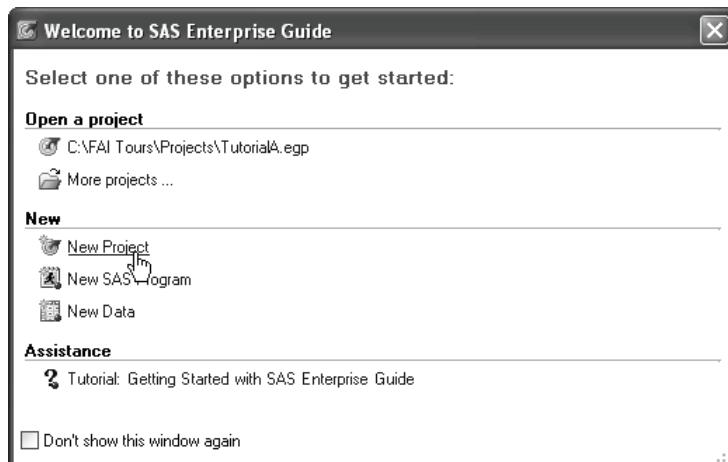
In this tutorial, you will create a basic report using the List Data task. Then using several of the options in the List Data task, you will make modifications to the report. Also, you will learn ways of formatting data that apply to most tasks. Here are the topics covered in this tutorial:

- Creating list reports
- Titles, footnotes, and labels
- Display formats
- User-defined formats
- Styles
- Result types



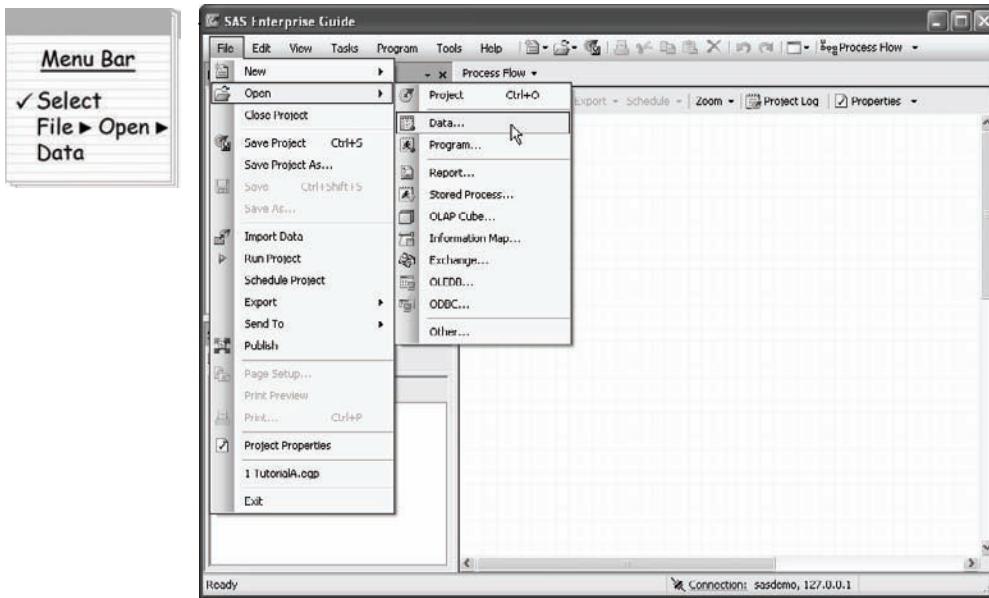
**Before beginning this tutorial** This tutorial uses the Tours data set, which contains information about the volcano tours offered by the Fire and Ice Tours company. The Tours data set is created as part of Tutorial A. If you did not complete Tutorial A, see Appendix A for the data and instructions for downloading the Tours data set.

**Starting SAS Enterprise Guide** Start SAS Enterprise Guide by either double-clicking the **SAS Enterprise Guide 4.2** icon on your desktop, or selecting **SAS Enterprise Guide 4.2** from the Windows **Start** menu. Starting SAS Enterprise Guide brings up the SAS Enterprise Guide windows in the background, with the Welcome window in the foreground. The Welcome window allows you to choose between opening an existing project or starting a new project. Click **New Project**.

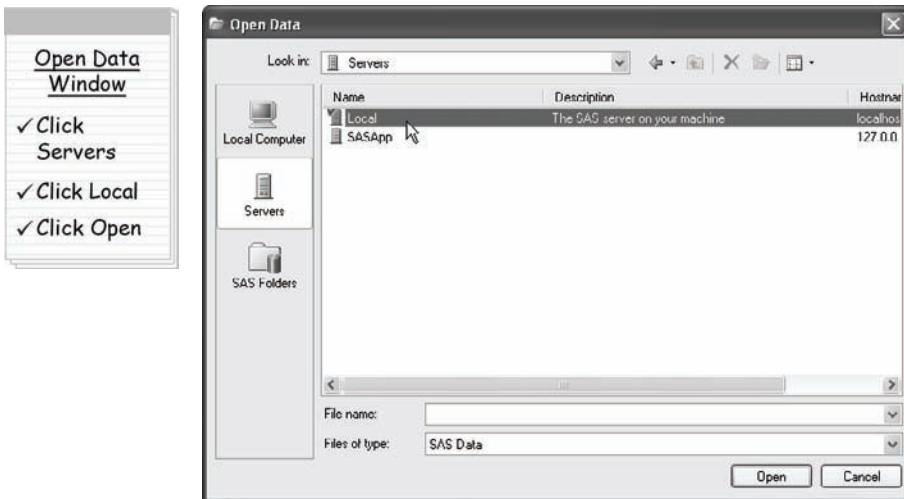


**Opening the Tours data set** Open the Tours data set created in Tutorial A by selecting **File ▶ Open ▶ Data** from the menu bar.

Tutorial B



This opens the Open Data window. In the panel on the left, you can choose to open files from your Local Computer, Servers, or SAS Folders. The Tours data set from Tutorial A was stored in the SASUSER library. The easiest way to access SAS libraries in the Open Data window is through the servers view, so click **Servers**. The servers view shows two servers (you may have additional servers, or only one), Local and SASApp.



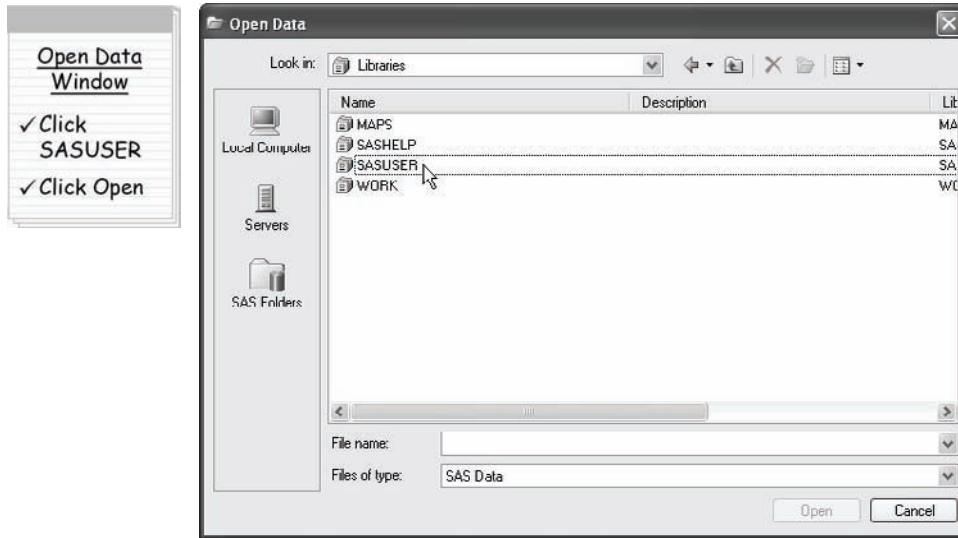
Then click **Local** to select it (if your SASUSER library is not on your local computer, then choose the appropriate server), and click **Open**.



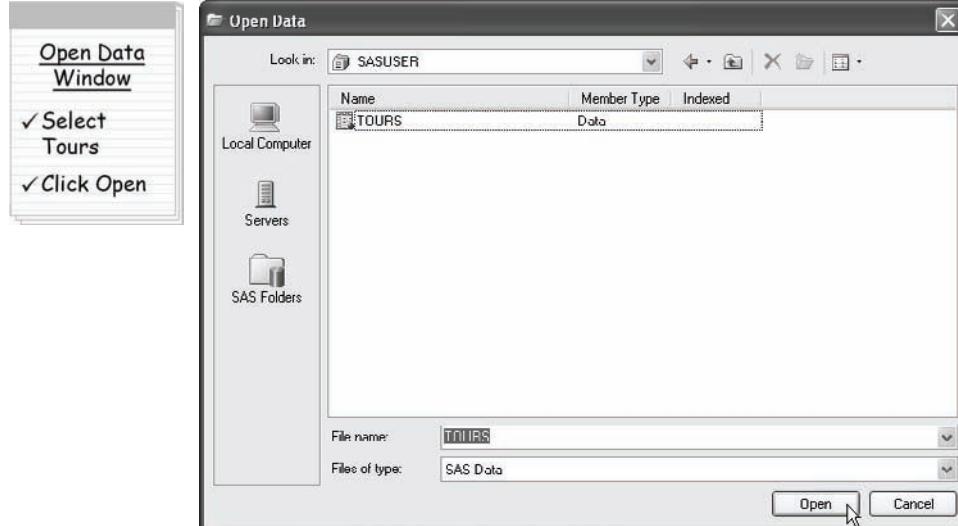
Click **Libraries**, then click **Open** to display all the defined SAS libraries for your computer.

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There are four libraries defined in this example: MAPS, SASHHELP, SASUSER, and WORK. You may have additional libraries defined.



Click **SASUSER**, then click **Open** to view the data sets in the SASUSER library.



Select the **Tours** data set and click **Open**. You may have additional data sets in your SASUSER library.

After you open the Tours data set, your screen should look like the following.

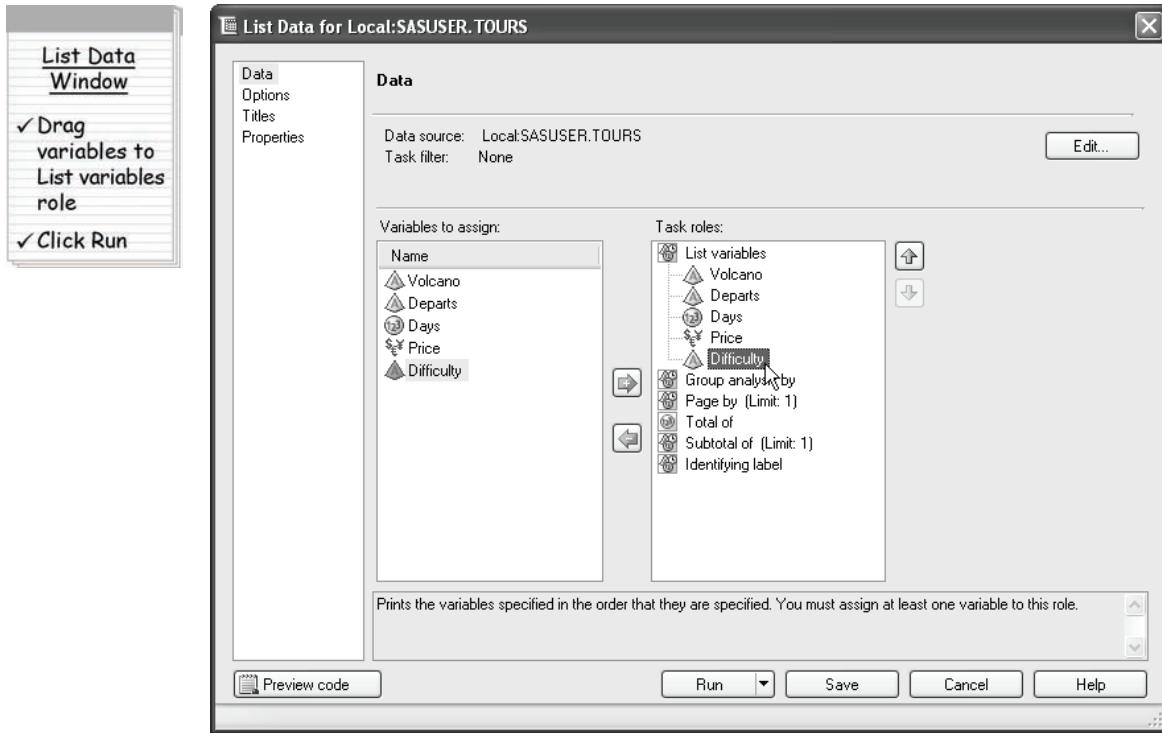
	Volcano	Departs	Days	Price	Difficulty
1	Etna	Catania	7	\$1,075	m
2	Fuji	Tokyo	2	\$225	c
3	Kenya	Nairobi	6	\$830	m
4	Kilauea	Hilo	1	\$55	a
5	Kilimanjaro	Nairobi	9	\$1,310	c
6	Krakatau	Jakarta	7	\$895	e
7	Poas	San Jose	1	\$65	c
8	Reventador	Quito	4	\$575	m
9	St. Helens	Portland	2	\$167	e
10	Vesuvius	Rome	6	\$985	e

**Creating a simple report** To produce a price list of all the tours offered by the Fire and Ice Tours company, use the List Data task. Select **Describe ▶ List Data** from the workspace toolbar for the Tours data set.

Workspace Toolbar  
✓ Select  
Describe ▶  
List Data

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This opens the List Data window. Before doing anything else, you need to assign variables to task roles. For a price list, all the variables in the data set should be listed, so assign all the variables to the **List variables** role. You can drag each variable separately, or you can highlight all the variables, and then drag the group to the List variables role. The order of the variables under List variables will be the order that the variables will appear in the report. To change the order, click and drag the variables up or down the list, or highlight the variable and use the up or down arrow buttons next to the **Task roles** box.



When you have all the variables under List variables in the proper order, click **Run**.

This produces a list of all the data in the Tours data set with some simple formatting. The result appears in the workspace, and, by default, the result will be in SAS Report format.

Report Listing						
Row number	Volcano	Departs	Days	Price	Difficulty	
1	Etna	Catania	7	\$1,075	m	
2	Fuji	Tokyo	2	\$225	c	
3	Kenya	Nairobi	6	\$830	m	
4	Kilauea	Hilo	1	\$55	e	
5	Kilimanjaro	Nairobi	9	\$1,310	c	
6	Krakatau	Jakarta	7	\$895	e	
7	Poas	San Jose	1	\$65	e	
8	Reventador	Quito	4	\$575	m	
9	St. Helens	Portland	2	\$167	e	
10	Vesuvius	Rome	6	\$985	e	

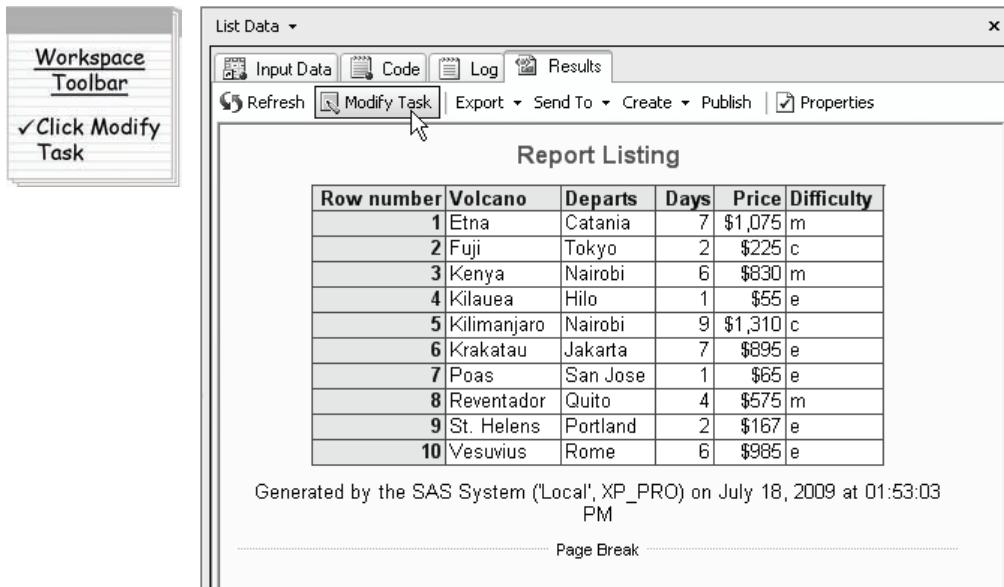
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PM

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Page Break-----

#### SAS Report Results Format

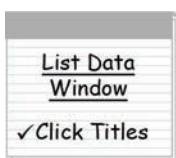
SAS Report Format is a special format that can be used to generate custom reports. These reports can combine multiple results, text, and images. Elements from results in SAS Report format can also be copied and pasted into other applications such as Microsoft Word and Excel.

**Changing titles and footnotes** The report contains all the information needed for the price list, but it could use some improvements. There are many parts of this simple listing that can be changed to meet specific needs. The first change to be made is to edit the title and footnote for the report. To change the titles and footnotes, reopen the List Data task by clicking **Modify Task** on the workspace toolbar for the results.

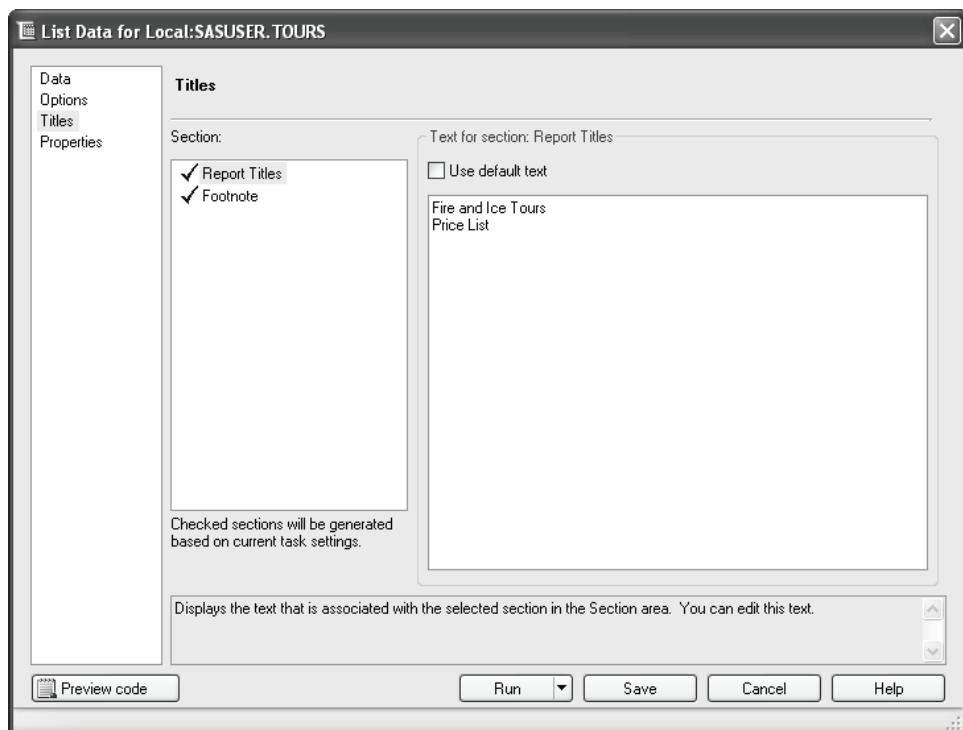


### Reopening Tasks

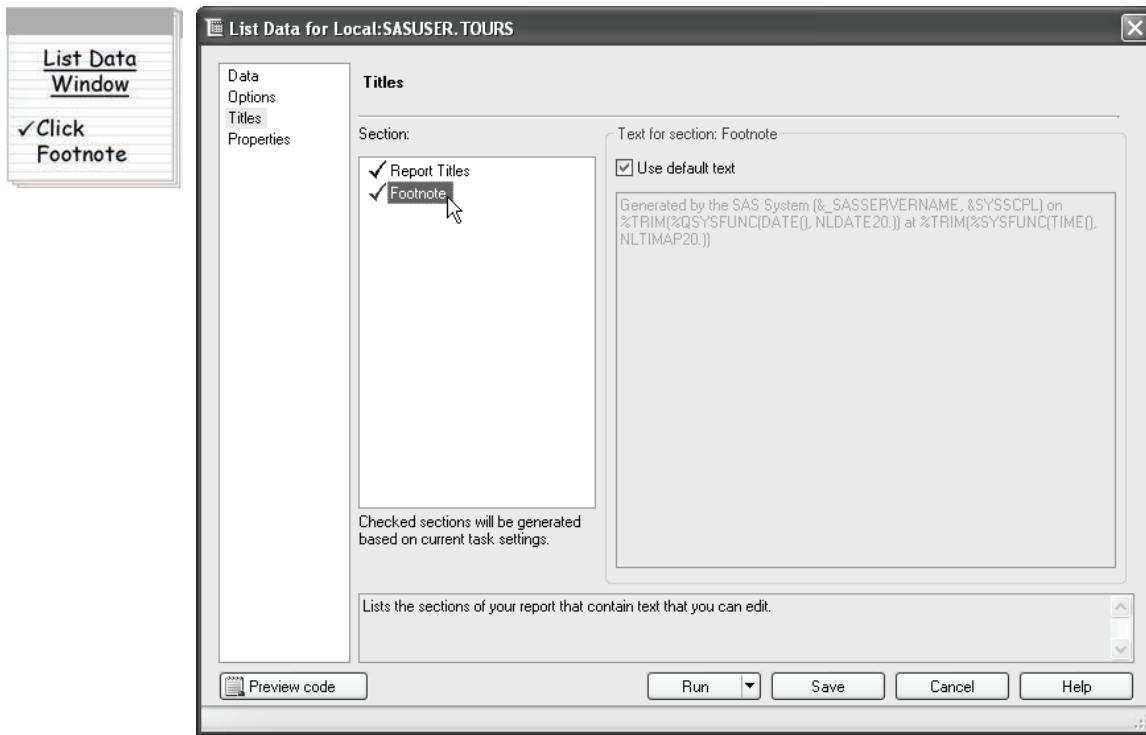
There are several ways you can reopen tasks to make modifications. You can click **Modify Task** on the workspace toolbar for the task result, or you can right-click the task icon in either the Process Flow or the Project Tree and select **Modify task-name** from the pop-up window.



Click **Titles** in the list of options in the selection pane on the left of the List Data window. You can make changes to both the titles and the footnotes in this window. When you click **Report Titles** in the box labeled **Section**, the current title is displayed in the box on the right side of the window. SAS Enterprise Guide has default text it will use for your report for both titles and footnotes. To change the title for your report, uncheck the box to the left of **Use default text**. Now you can edit the default text that SAS Enterprise Guide supplied. Delete the default text and replace it with **Fire and Ice Tours** on one line, followed by **Price List** on the second line. This produces a two-line title with both lines centered at the top of the report.



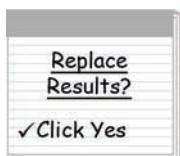
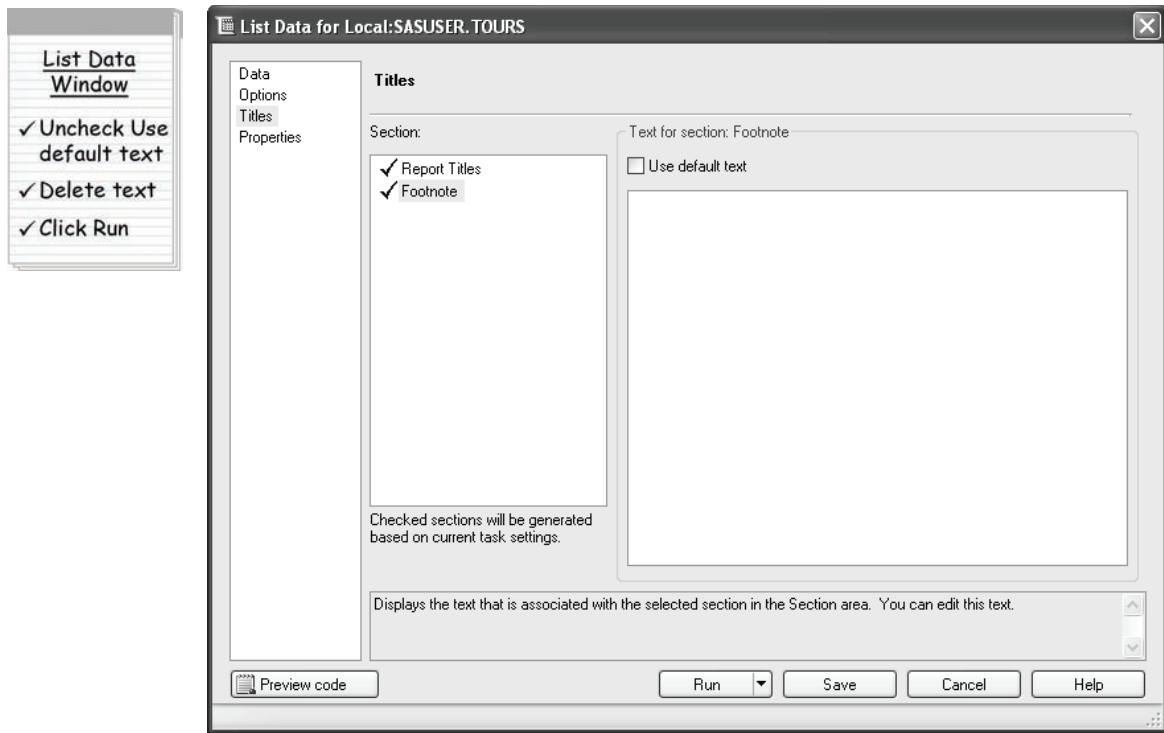
To make changes to the footnote, click **Footnote** in the box labeled **Section**.



#### Why Does the Default Footnote Text Look So Odd?

If you take a close look at the default text for the footnote, you will notice that it does not look much like the footnote that appears at the bottom of your reports. The default text contains calls to SAS macros (starting with %) and macro variables (starting with &). These calls generate the actual text for the footnote, and the text that is generated depends on the date and time the report was produced, and the name and type of SAS server that generated the report. You can change the default footnote text by selecting **Tools ▶ Options** from the menu bar and selecting the **Tasks General** page. Enter the desired text in the **Default footnote text for task output** box. Then all tasks run after this change will have the new footnote text, even if you open a new project.

Change the footnote the same way you changed the title. Uncheck **Use default text**. Then because no footnote is necessary for this report, simply delete the text that SAS Enterprise Guide supplied.



Click **Run** to produce a revised report with a new title and no footnote. When SAS Enterprise Guide asks if you want to replace the previous results, click **Yes**.

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The following report will appear in the workspace. Note the new title and the lack of a footnote.

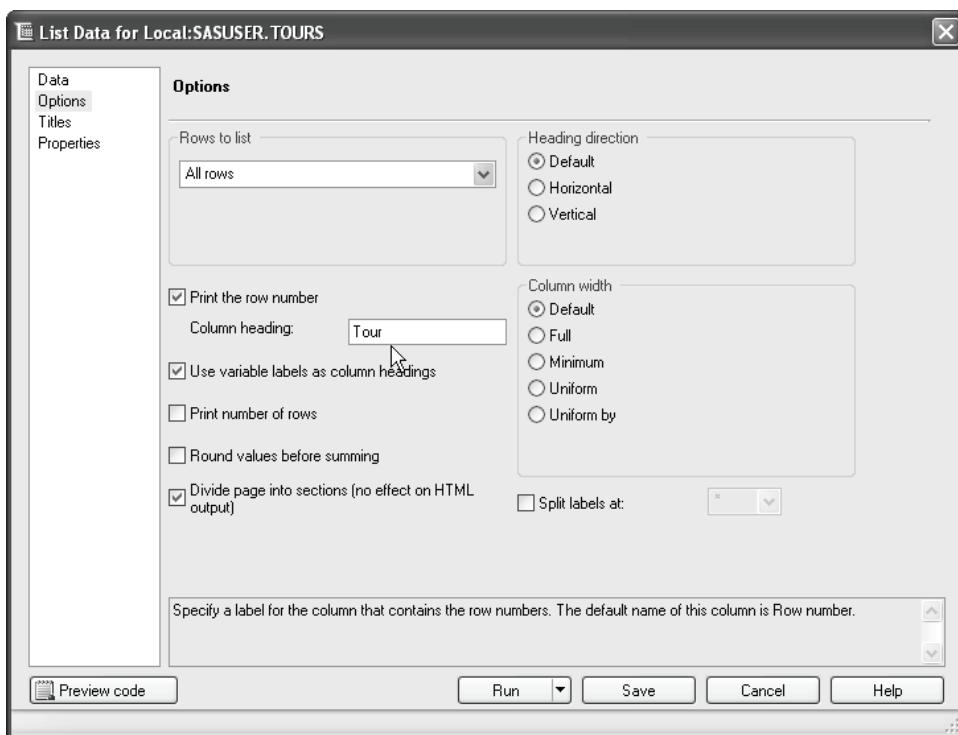
Fire and Ice Tours					
Price List					
Row number	Volcano	Departs	Days	Price	Difficulty
1	Etna	Catania	7	\$1,075	m
2	Fuji	Tokyo	2	\$225	c
3	Kenya	Nairobi	6	\$830	m
4	Kilauea	Hilo	1	\$55	e
5	Kilimanjaro	Nairobi	9	\$1,310	c
6	Krakatau	Jakarta	7	\$895	e
7	Poas	San Jose	1	\$65	e
8	Reventador	Quito	4	\$575	m
9	St. Helens	Portland	2	\$167	e
10	Vesuvius	Rome	6	\$985	e

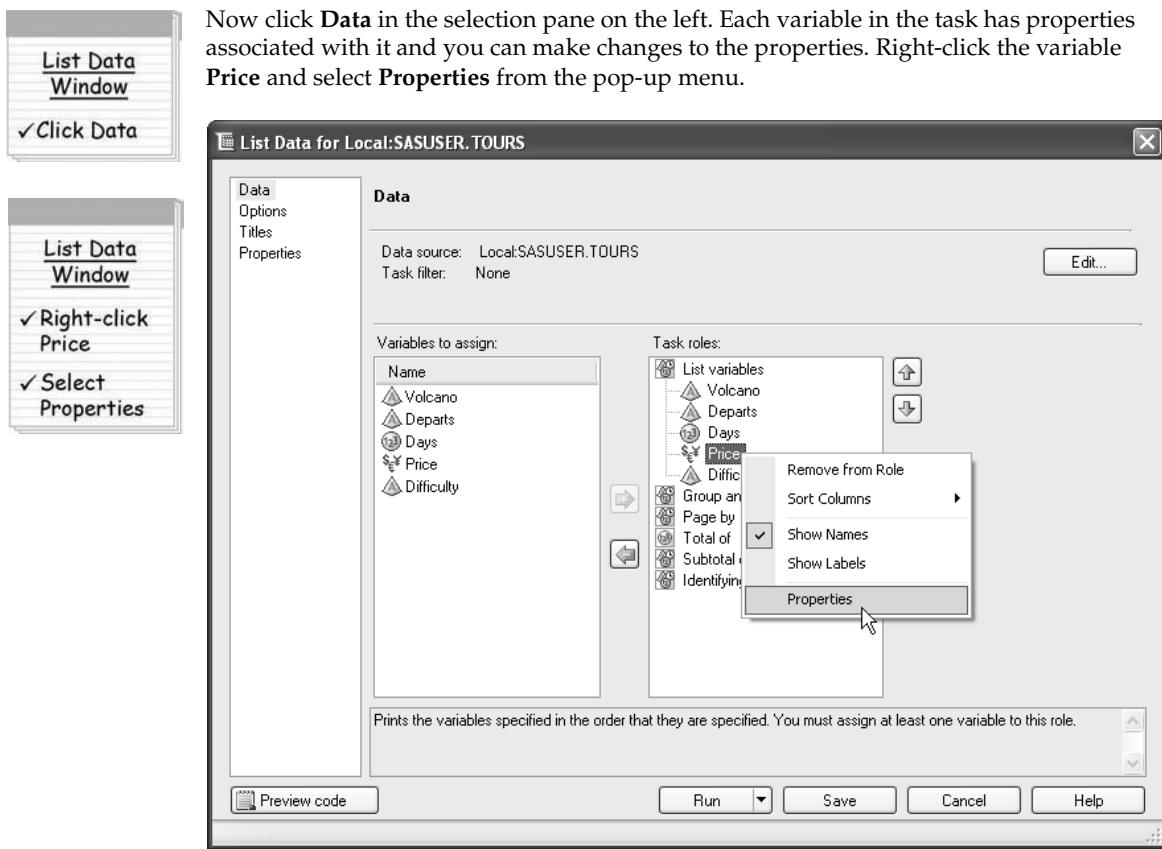
----- Page Break -----



- Workspace Toolbar**
- ✓ Click Modify Task

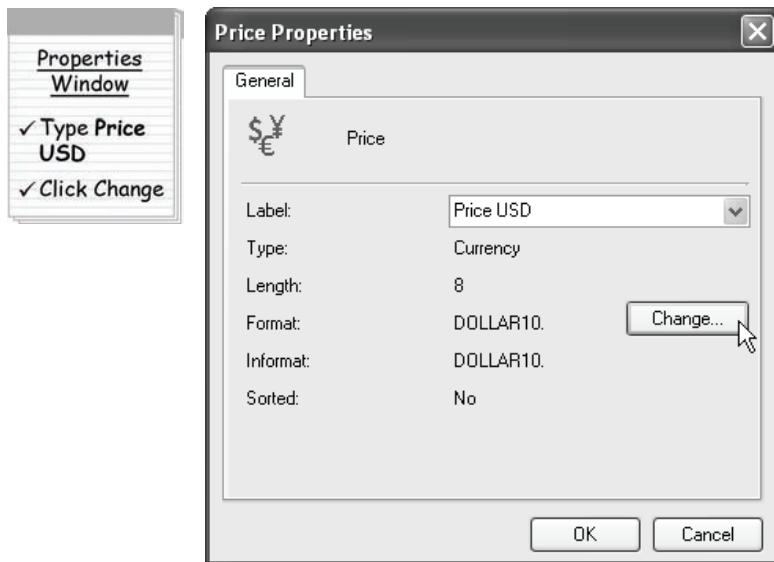
**Changing column labels and formatting values** To make more changes to the report, open the List Data task window again by clicking **Modify Task** on the workspace toolbar for the results. Click **Options** in the selection pane on the left. By default, SAS Enterprise Guide will show the row number in the report and give it the label Row number. You can choose not to show the row numbers by unchecking **Print the row number**. For this report, keep the row numbers, but replace the label for the column heading with the word **Tour**.



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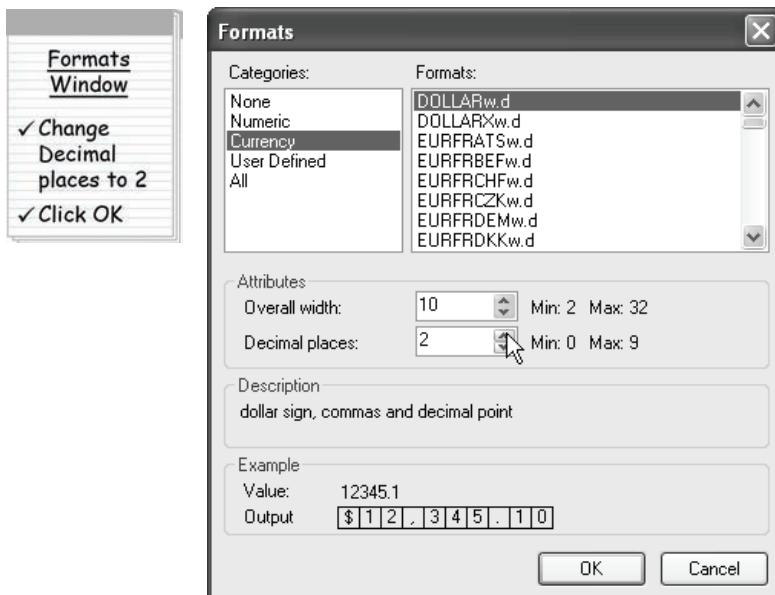
This opens the Properties window for the variable Price.

There are six properties listed in the Properties window, two of which you can change in the window: the Label and the Format. Changes that you make in this window will affect only the results of the List Data task. The changes are not stored with the data. The Label is text that can be used for labeling the variable in the report. If the variable does not have a label, then SAS Enterprise Guide will use the variable's name as a label. Give the variable Price the label "Price USD" by typing **Price USD** in the box next to the word Label.



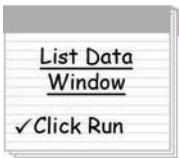
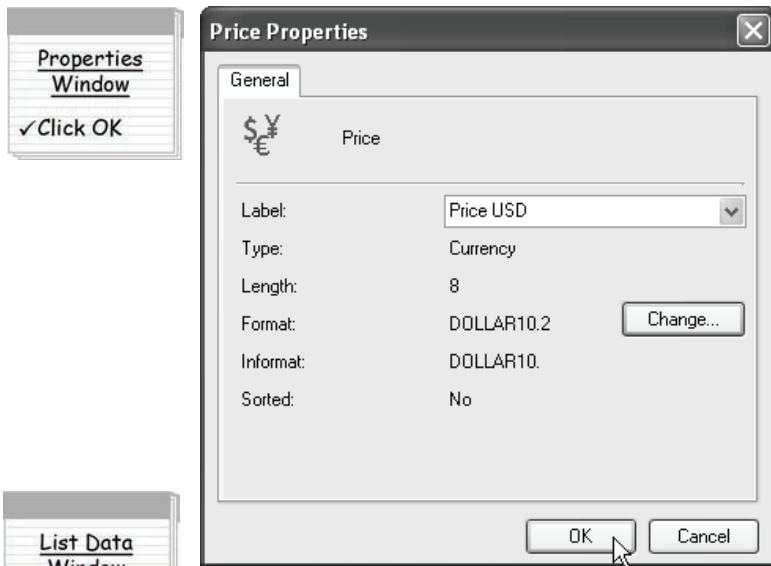
The current format for Price is the DOLLAR10. format. Click **Change** to change the format for Price. This opens the Formats window.

Formats determine how values for the variable will be displayed. The format DOLLAR10. that was assigned to Price displays values with dollar signs and commas. The number at the end of the format name determines how many spaces to allow for the value, including any commas, decimal places, and dollar signs. If decimal places are to be displayed, then the number of decimals follows the period at the end of the format name. Because there is no number after the period in the DOLLAR10. format, no decimal places will be displayed. Change the number of decimal places displayed for Price to 2 in the box next to **Decimal places**. Notice that when you do this, an example of how values will be displayed using this format appears at the bottom of the Formats window.



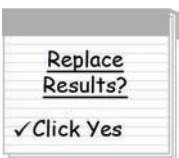
Click **OK** to close the Formats window.

Now Price has a label and will be formatted with the DOLLAR10.2 format.



Click **OK** to close the Properties window, and then click **Run** in the List Data window.

Select **Yes** when SAS Enterprise Guide asks if you want to replace the previous results.



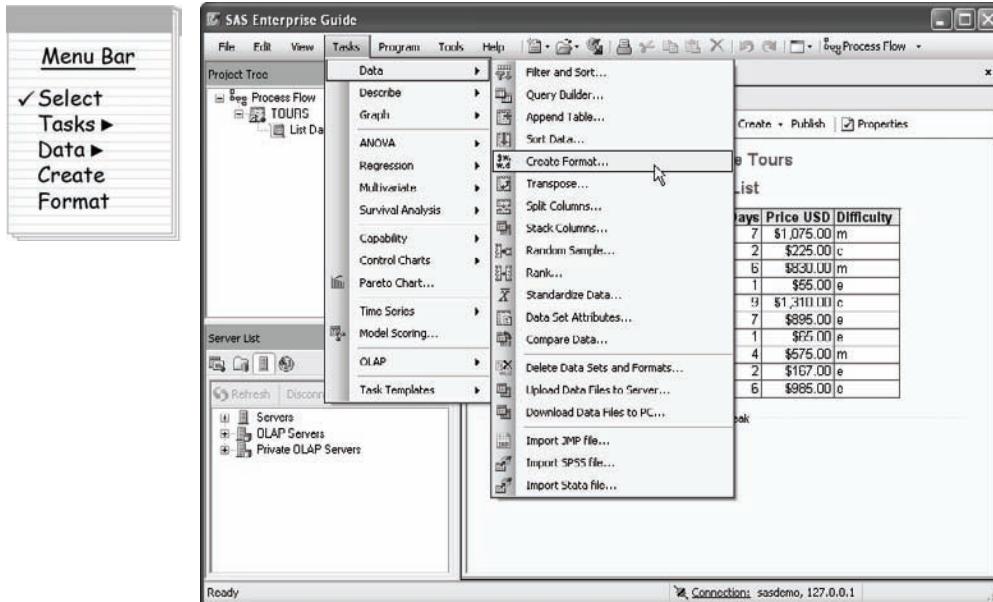
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The following report will appear in the workspace. Notice the column heading for the row number and the Price variable, and that the values for Price are now displayed in dollars and cents.

Fire and Ice Tours					
Price List					
Tour	Volcano	Departs	Days	Price USD	Difficulty
1	Etna	Catania	7	\$1,075.00	m
2	Fuji	Tokyo	2	\$225.00	c
3	Kenya	Nairobi	6	\$830.00	m
4	Kilauea	Hilo	1	\$55.00	e
5	Kilimanjaro	Nairobi	9	\$1,310.00	c
6	Krakatau	Jakarta	7	\$895.00	e
7	Poas	San Jose	1	\$65.00	e
8	Reventador	Quito	4	\$575.00	m
9	St. Helens	Portland	2	\$167.00	e
10	Vesuvius	Rome	6	\$985.00	e

..... Page Break .....

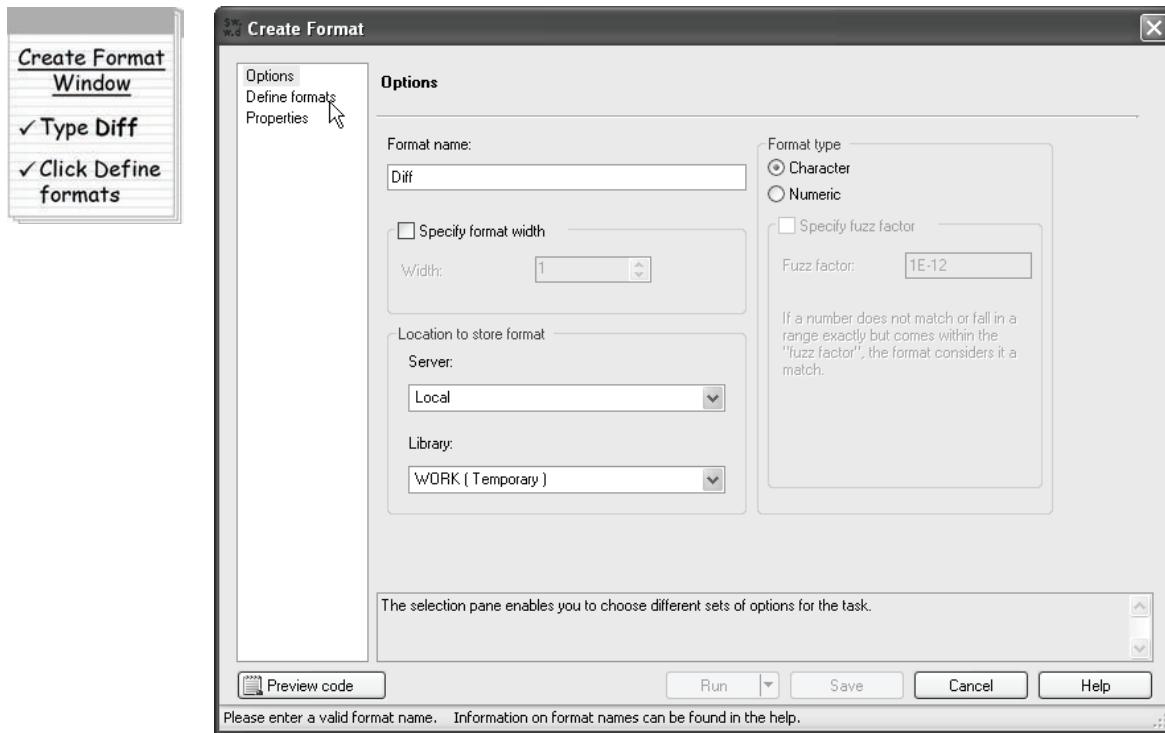
**Defining your own formats** Many different formats come with SAS Enterprise Guide, but sooner or later you will have a particular need for which there is no format defined. Fortunately, SAS Enterprise Guide provides a way for you to create your own formats. This type of format is called a user-defined format. For example, the variable **Difficulty** has coded values of c, e, and m. These single-letter values are too cryptic for a price list; it would be better to spell out the values: Challenging, Easy, and Moderate. To create a user-defined format, select **Tasks ▶ Data ▶ Create Format** from the menu bar to open the Create Format window.



### Location for Storing Formats

Formats can be temporary or permanent. If they are temporary, they are stored in the WORK library and are automatically deleted when you exit SAS Enterprise Guide. If you have a temporary format in your project that you want to use, then you will need to rerun the Create Format task every time you open SAS Enterprise Guide. You can save a format permanently by choosing a library other than WORK. Then the format will not only be available for the project in which it was created, it will also be available for other projects. If you have access to more than one SAS server, store the format on the same server that is used for the task. To see which server is used for a task, place the cursor over the task icon in the Process Flow and the server name will be displayed in the pop-up window. The server is also displayed in the Properties window for the task.

Give the format a name by typing **Diff** in the box under **Format name**. Because this format will be used for a character variable, leave the **Format type** as **Character**.

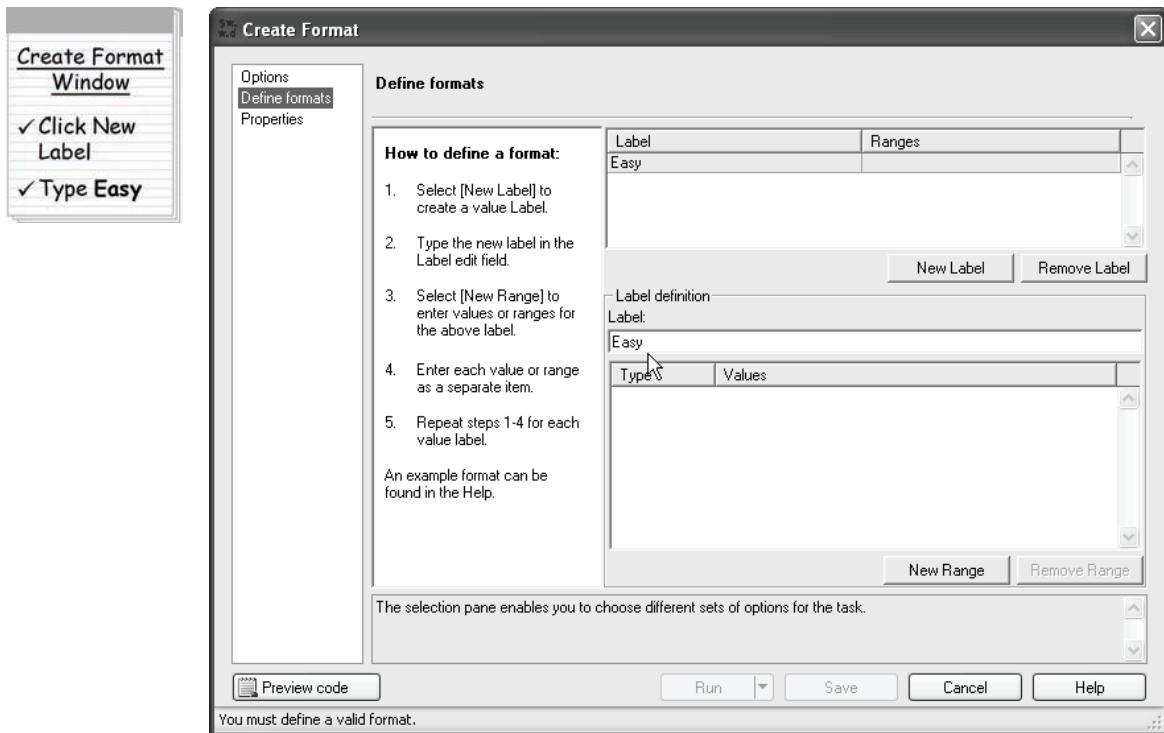


Click **Define formats** in the selection pane on the left to set values and ranges for the format.

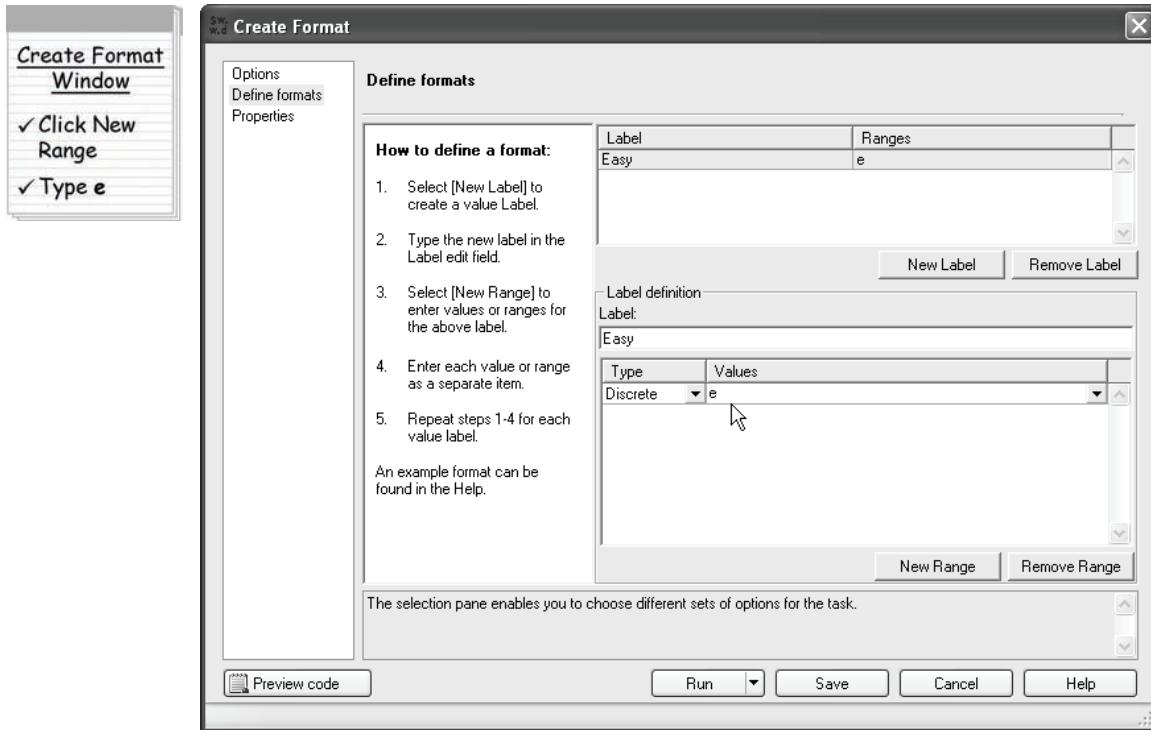
#### Format Names

Character format names must be 31 characters or fewer in length, while numeric format names must be 32 characters or fewer. For both format types, names must contain only letters, numerals, or underscores, and cannot start or end with a numeral.

There are instructions in this window telling you how to define your format. First, click **New Label** and type **Easy** in the box under the word **Label** in the Label definition portion of the window. As you type the label, the label appears in the Label box at the top of the window.



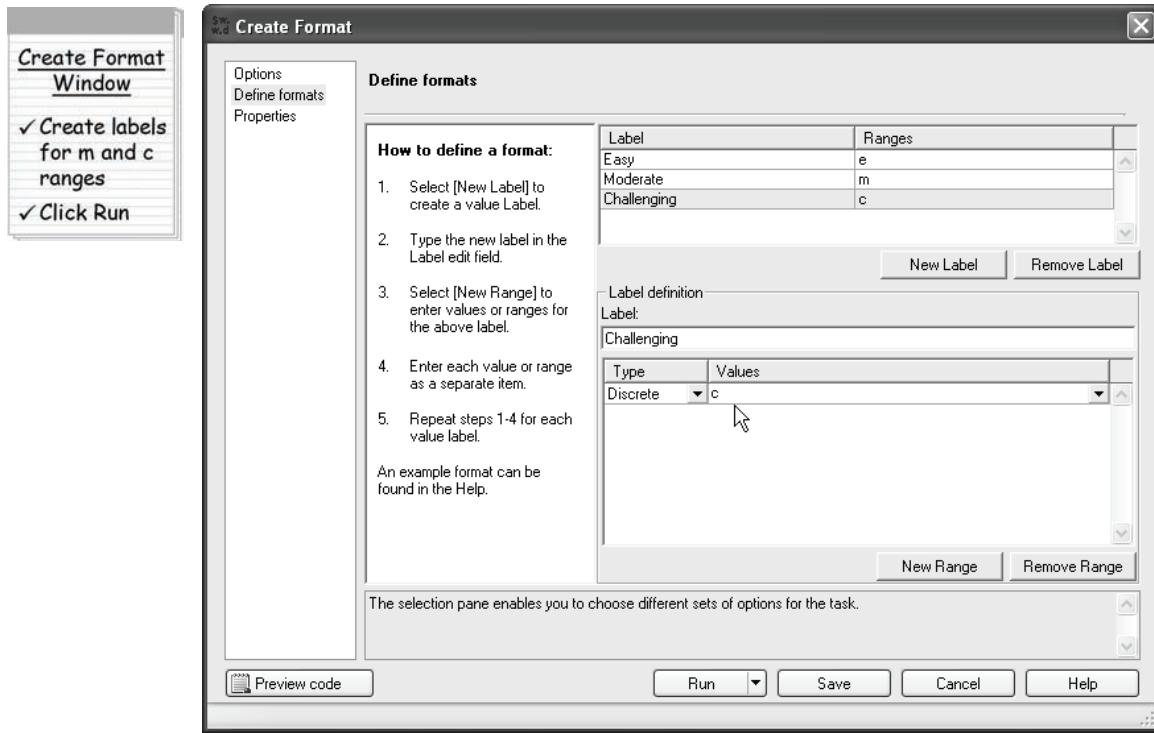
Next click **New Range**. In the box under **Values**, type the lowercase letter **e**, which is the value to be associated with the label **Easy**. When you enter text values, it is important that the case of the text matches the case of the actual value. Character formats are case sensitive. As you type the value, it will appear in the **Ranges** box at the top of the window, beside the label **Easy**.



### Multiple Ranges for a Label

You can enter more than one range for a label by clicking **New Range** again before adding another new label. For example, you might want the months SEP, OCT, and NOV to all be given the label Fall (or Spring if you are in the southern hemisphere). If you have a consecutive range of values that should all have the same label, then select **Range** from the **Type** drop-down list. For example, you might want the values 13 to 19 to all have the label Teenager. If your format is character and you use the Range type, then all values that fall alphabetically between the end points of the range will be included.

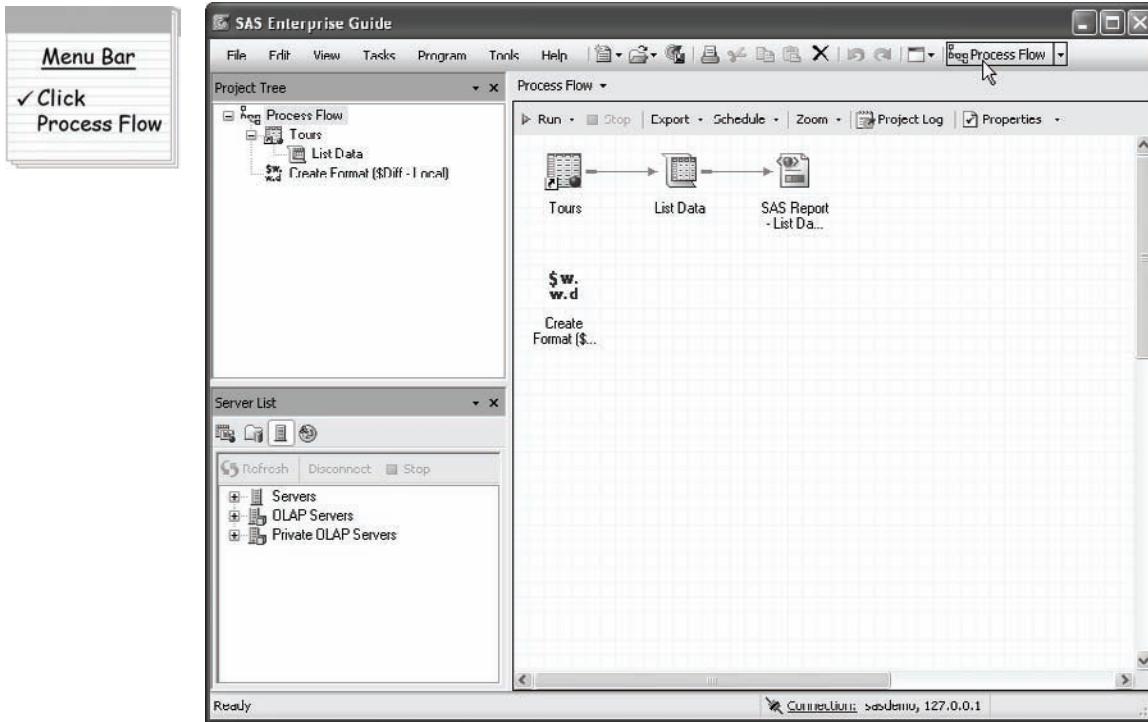
Now add labels for the other two values, m and c. Click **New Label** and type **Moderate** in the box under the word **Label** in the Label definition portion of the window. Click **New Range** and in the box under **Values**, type the letter **m**. Next click **New Label** and type **Challenging** in the box under **Label** in the Label definition portion of the window. Click **New Range** and type the letter **c** in the box under **Values**.

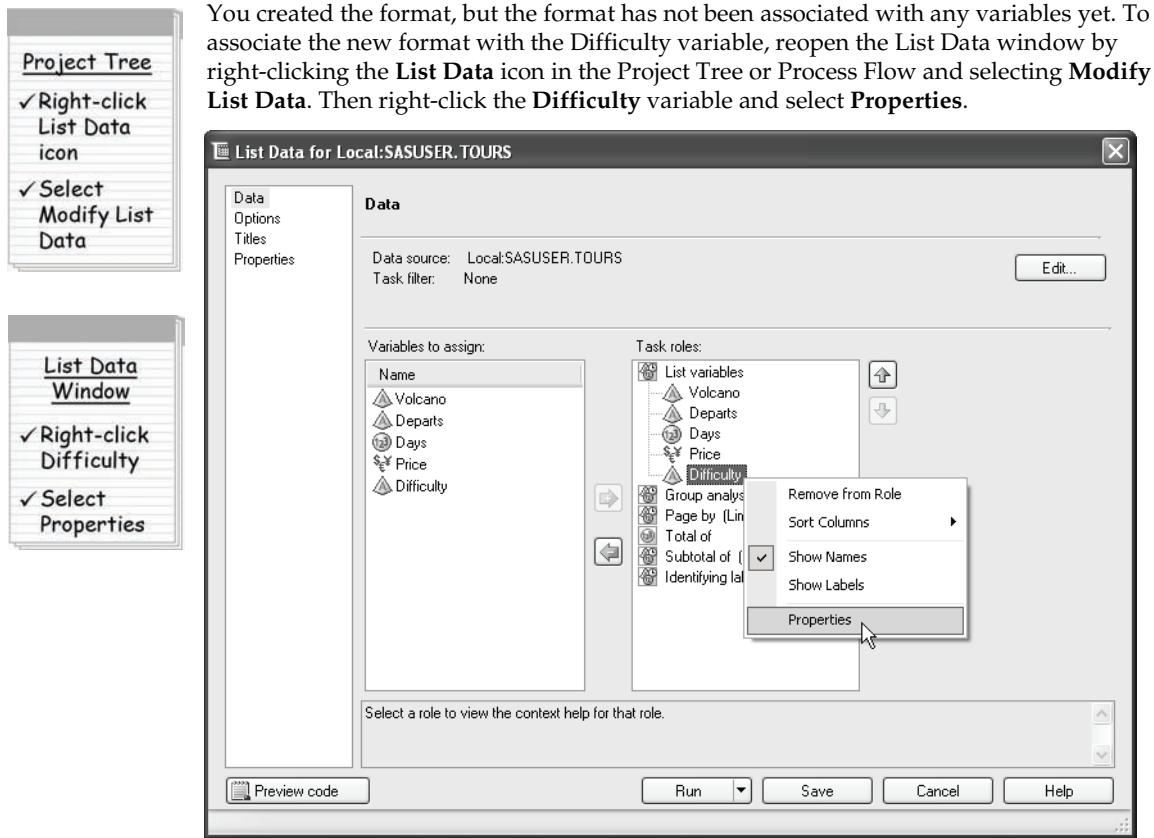


When you have all the labels and ranges defined, click **Run**.

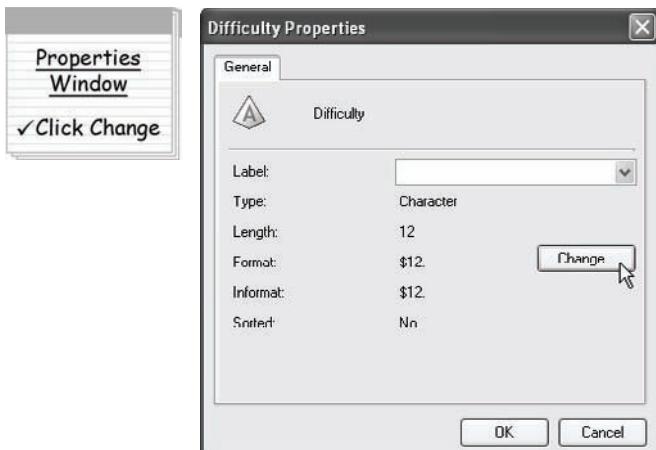
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Since there is no output from the Create Format task, after running, the SAS log is displayed in the workspace. Click **Process Flow** on the menu bar to view the Process Flow. An icon for the Create Format task appears in the Project Tree and the Process Flow. Notice that the Create Format task is not connected to anything in the Process Flow, and nothing in the report changed.





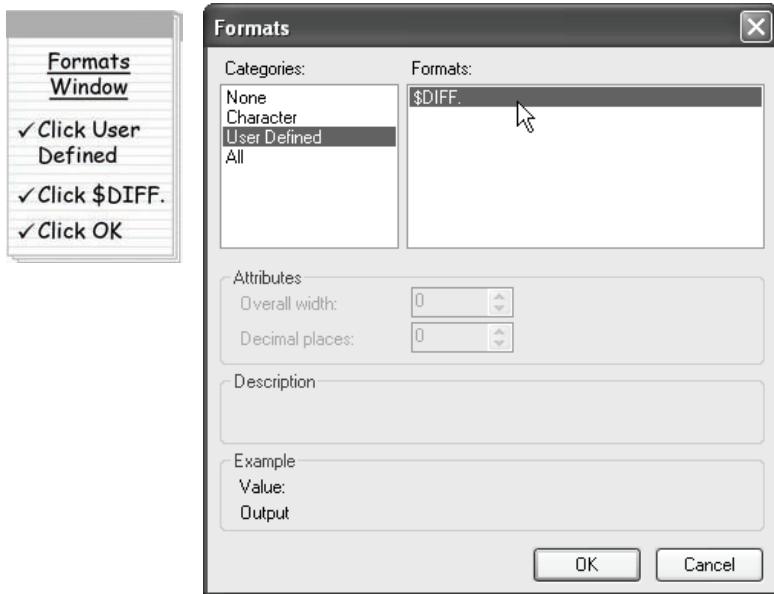
This opens the Properties window for the variable **Difficulty**.



Click **Change** to open the Formats window.

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From the **Categories** list, select **User Defined**. Any formats defined in the current SAS Enterprise Guide session or any formats that have been saved in a permanent location appear in the list of formats. The format \$DIFF. should be in your list and you may or may not have additional formats. The \$ in the format name indicates that the format is for character values. Click the \$DIFF. format.



Click **OK** to close the Formats window, and then click **OK** again in the Properties window to return to the List Data window. Click **Run** in the List Data window, and click **Yes** to replace the previous results.



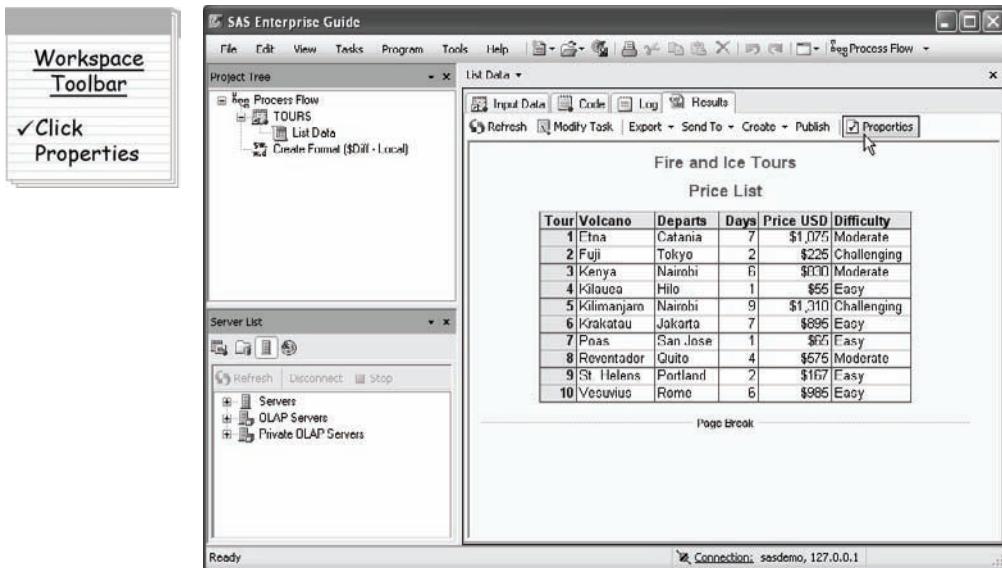
The following report will appear in the workspace, showing the formatted values for the Difficulty variable.

Fire and Ice Tours					
Price List					
Tour	Volcano	Departs	Days	Price USD	Difficulty
1	Etna	Catania	7	\$1,075.00	Moderate
2	Fuji	Tokyo	2	\$225.00	Challenging
3	Kenya	Nairobi	6	\$830.00	Moderate
4	Kilauea	Hilo	1	\$55.00	Easy
5	Kilimanjaro	Nairobi	9	\$1,310.00	Challenging
6	Krakatau	Jakarta	7	\$895.00	Easy
7	Poas	San Jose	1	\$65.00	Easy
8	Reventador	Quito	4	\$575.00	Moderate
9	St. Helens	Portland	2	\$167.00	Easy
10	Vesuvius	Rome	6	\$985.00	Easy

..... Page Break .....

**Selecting a style for the report** Every report that you produce in SAS Enterprise Guide has a style associated with it (except for results produced in text format which have no style). All the reports that you have produced so far have been in SAS Report format, and the default style for SAS Report results is Analysis. The style of the report includes the color scheme, fonts, and the size and style of the font. You do not have to use the default style for your reports. SAS Enterprise Guide comes with many different styles for you to choose from, and if you can't find one that suits your needs, you can create your own.

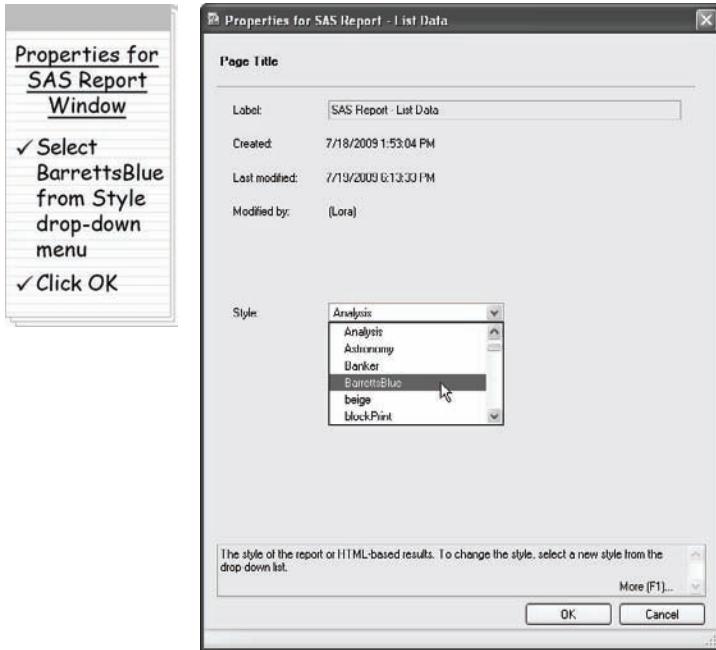
To change the report style for SAS Report (and HTML) results, click **Properties** on the workspace toolbar for the List Report results.



### Changing the Default Style Used for SAS Enterprise Guide

If you find a style that you want to use for all your SAS Enterprise Guide projects, you can set it to be the default. Select **Tools** ▶ **Options** from the menu bar. In the selection pane on the left, select a result format: SAS Report, HTML, RTF, or PDF. Then select the style from the **Style** drop-down list.

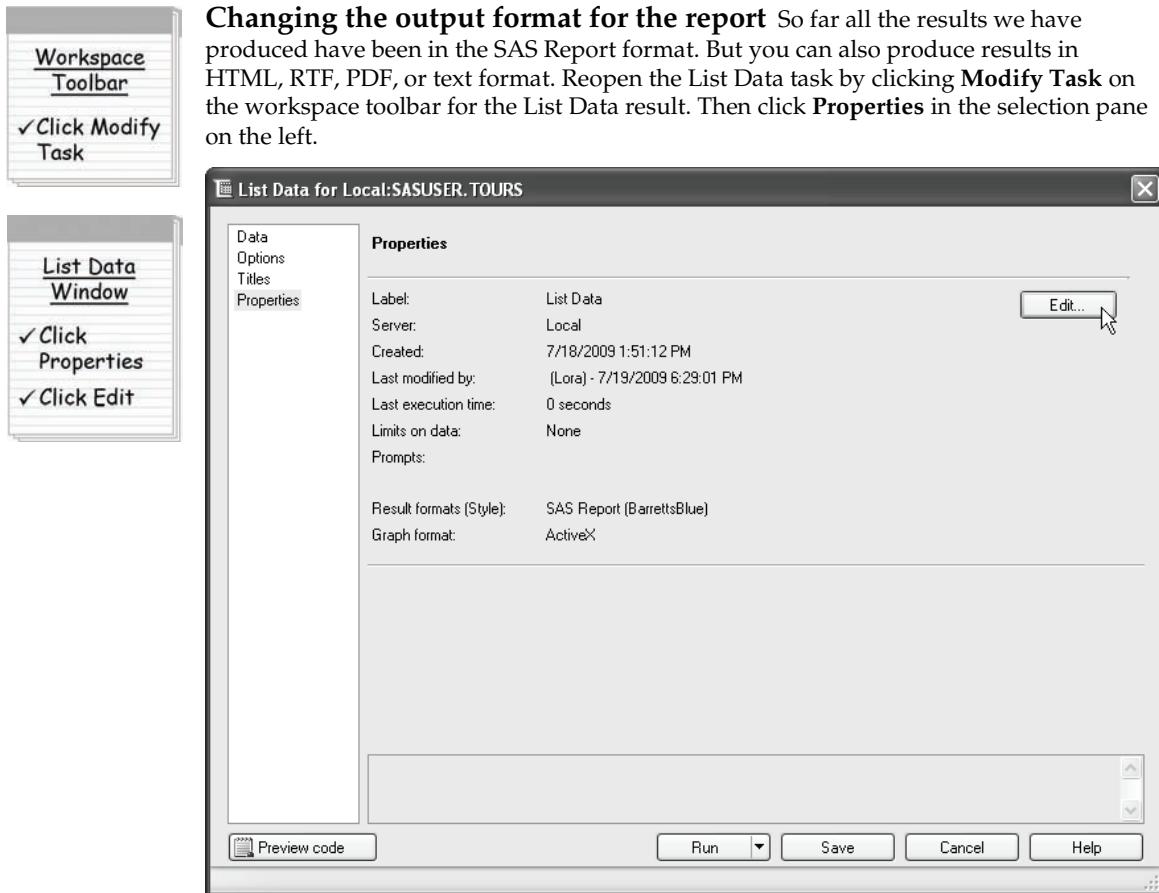
This opens the Properties window for the SAS Report results created from the List Data task. Select the **BarrettsBlue** style from the drop-down Style menu.



Click **OK**. Your report should look like the following, except that yours will be in shades of blue.

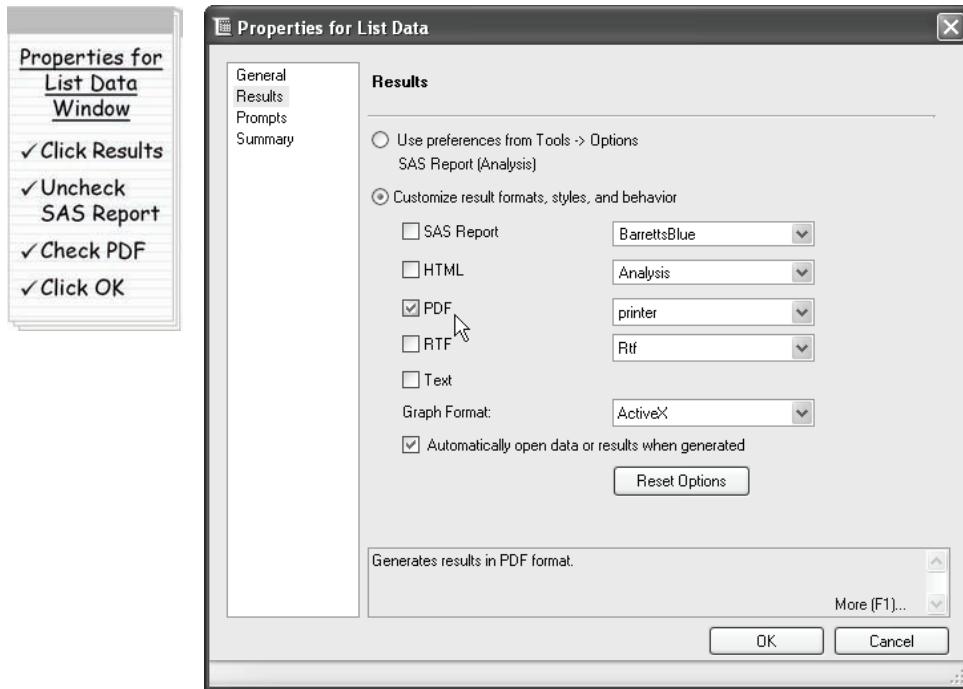
<b>Fire and Ice Tours</b>					
<b>Price List</b>					
Tour	Volcano	Departs	Days	Price USD	Difficulty
1	Etna	Catania	7	\$1,075.00	Moderate
2	Fuji	Tokyo	2	\$225.00	Challenging
3	Kenya	Nairobi	6	\$830.00	Moderate
4	Kilauea	Hilo	1	\$55.00	Easy
5	Kilimanjaro	Nairobi	9	\$1,310.00	Challenging
6	Krakatau	Jakarta	7	\$895.00	Easy
7	Poas	San Jose	1	\$65.00	Easy
8	Reventador	Quito	4	\$575.00	Moderate
9	St. Helens	Portland	2	\$167.00	Easy
10	Vesuvius	Rome	6	\$985.00	Easy

Page Break

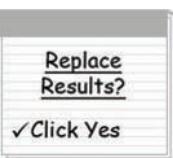
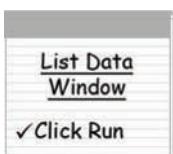


Click **Edit** to make changes to the properties of the task.

This opens the Properties window for the List Data task. Click **Results** in the selection pane on the left. On the Results page you can choose from several different result formats, as well as choose alternate styles for the task result. Click the box next to SAS Report to turn off the SAS Report result format, then check PDF.



Click **OK** to close the Properties window, click **Run** in the List Data window, and click **Yes** to replace the previous results.



#### Choosing Default or Custom Result Formats and Styles

To use the default format and style, check **Use preferences from Tools -> Options** in the Results page of the Properties window for the task. To customize the format and style for the result of the task, check **Customize result formats, styles, and behavior**. Because we already changed the style for this task, the results are customized. Normally, if no changes were made to the task formats or styles, **Use preferences from Tools -> Options** will be checked.

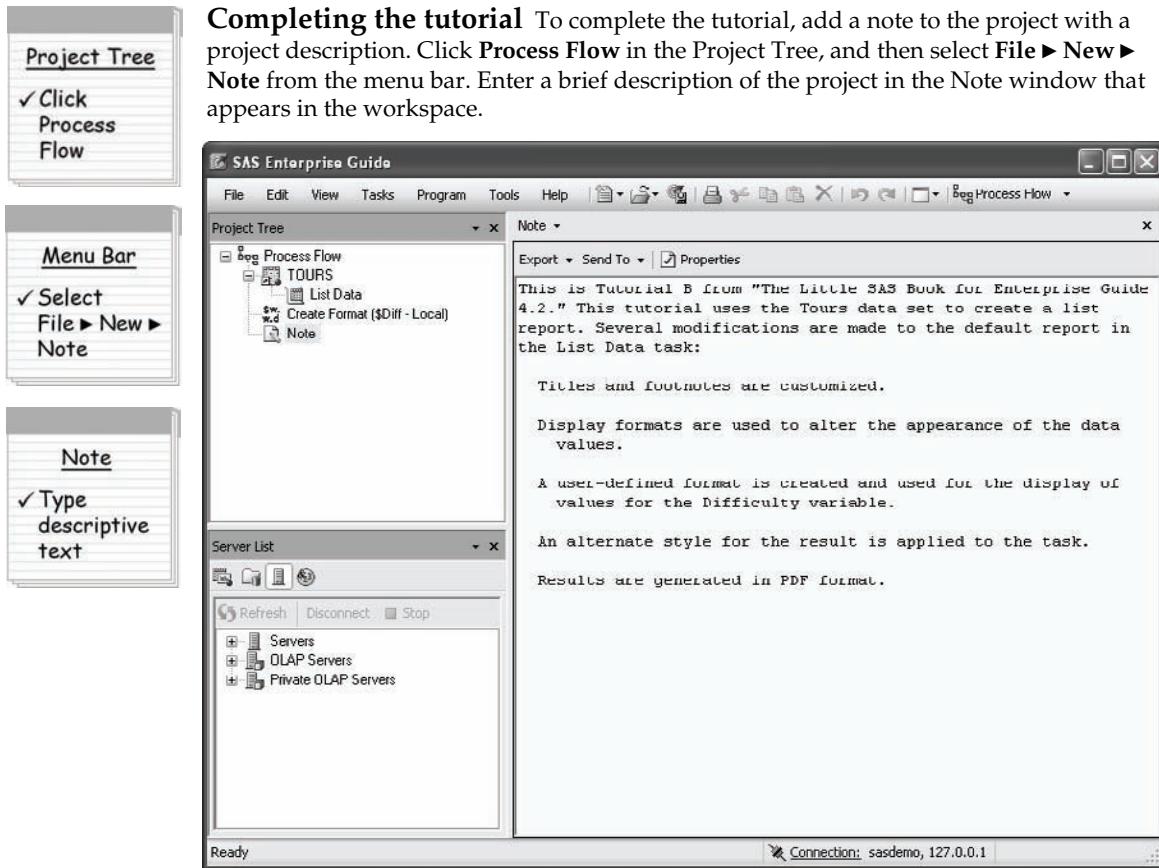
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If the results do not appear in the workspace, click the **Results** tab to view the PDF results.

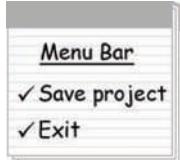
The screenshot shows the SAS Enterprise Guide interface. In the center, a report titled "Fire and Ice Tours Price List" is displayed in a grid format. The columns are labeled: Tour, Volcano, Departs, Days, Price USD, and Difficulty. The data consists of 10 rows, each representing a tour with its details. To the left of the report, there is a sidebar with a "Bookmarks" section containing a link to "The Print Procedure". Below the sidebar, a "Server List" window is open, showing a list of servers: Servers, OLAP Servers, and Private OLAP Servers. The "Ready" status bar is visible at the bottom of the screen.

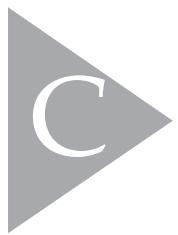
Tour	Volcano	Departs	Days	Price USD	Difficulty
1	Etna	Catania	7	\$1,075	Moderate
2	Fuji	Tokyo	2	\$225	Challenging
3	Kenya	Nairobi	6	\$930	Moderate
4	Kilimanjaro	Hilo	1	\$55	Easy
5	Kilimanjaro	Nairobi	9	\$1,310	Challenging
6	Krakatoa	Jakarta	7	\$095	Easy
7	Peas	San Jose	1	\$65	Easy
8	Revenador	Quito	4	\$575	Moderate
9	St. Helens	Pouland	2	\$107	Easy
10	Vesuvius	Rome	6	\$095	Easy

**Completing the tutorial** To complete the tutorial, add a note to the project with a project description. Click **Process Flow** in the Project Tree, and then select **File ▶ New ▶ Note** from the menu bar. Enter a brief description of the project in the Note window that appears in the workspace.



Now save the project and exit SAS Enterprise Guide. Select **File ▶ Save Project As** from the menu bar. Navigate to the location where you want to save the project, give the project the name **TutorialB**, and click **Save**. Select **File ▶ Exit** from the menu bar to close SAS Enterprise Guide.





“ The power of imagination  
makes us infinite. ”

JOHN MUIR

Tutorial C

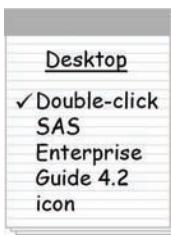
From *John of the Mountains: The Unpublished Journals of John Muir*, 1938.

## C Working with Data in the Query Builder

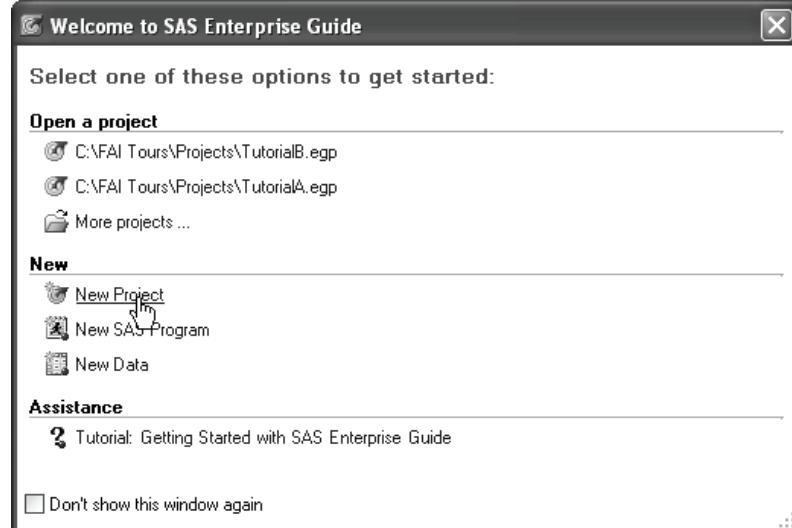
Often the data tables you have are not exactly what you want. You may need to compute a new column based on existing columns, or you may need just part of the data table for your analysis. Using SAS Enterprise Guide, there are many ways in which you can manipulate your data. This tutorial covers the following topics in the Query Builder:

- Selecting columns
- Using the Expression Editor to create new columns
- Filtering rows
- Sorting data

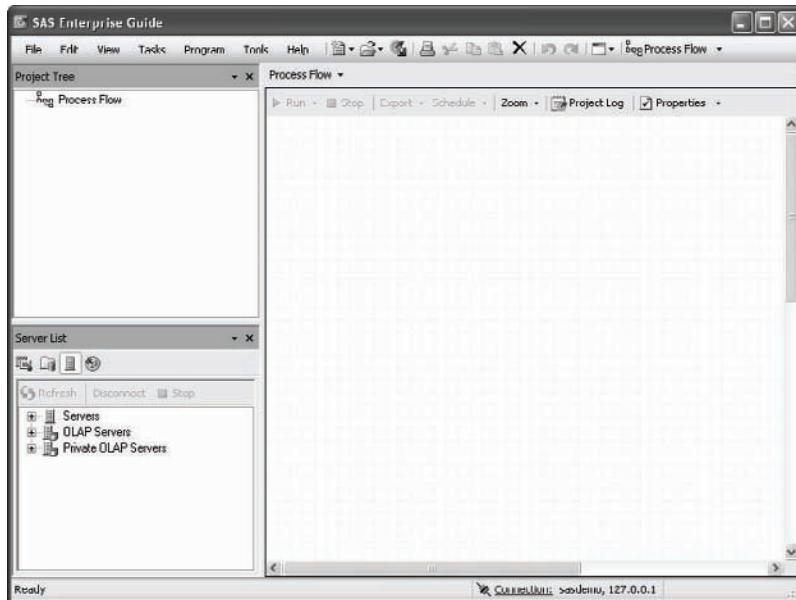
**Before beginning this tutorial** This tutorial uses the Volcanoes SAS data table, which contains information about volcanoes around the world. The data and instructions for downloading the file can be found in Appendix A.

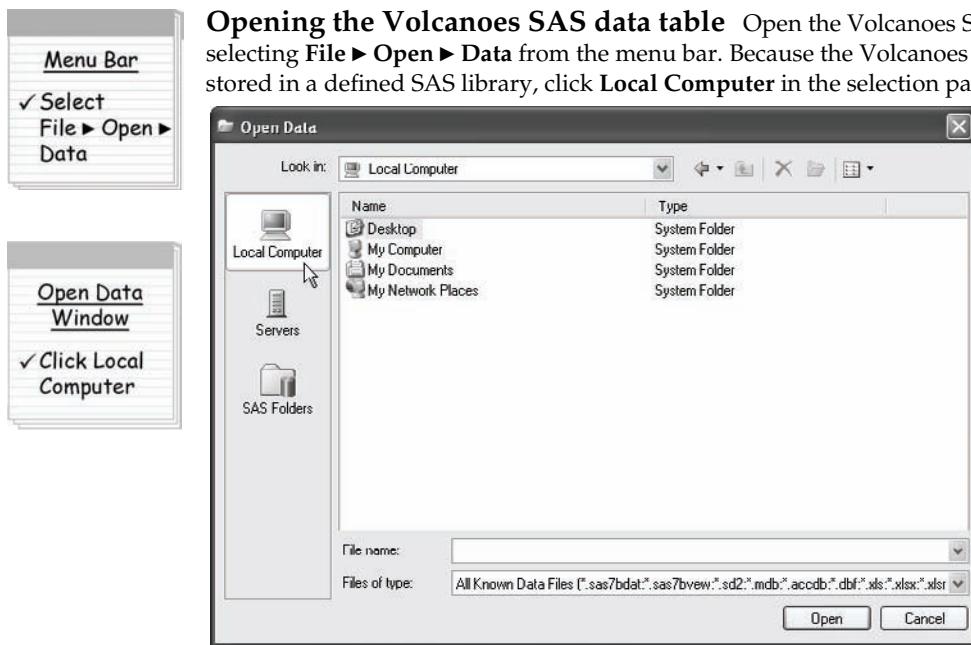


**Starting SAS Enterprise Guide** Start SAS Enterprise Guide by either double-clicking the **SAS Enterprise Guide 4.2** icon on your desktop, or selecting **SAS Enterprise Guide 4.2** from the Windows **Start** menu. Starting SAS Enterprise Guide brings up the SAS Enterprise Guide windows in the background, with the Welcome window in the foreground. The Welcome window allows you to choose between opening an existing project or starting a new project. Click **New Project**.

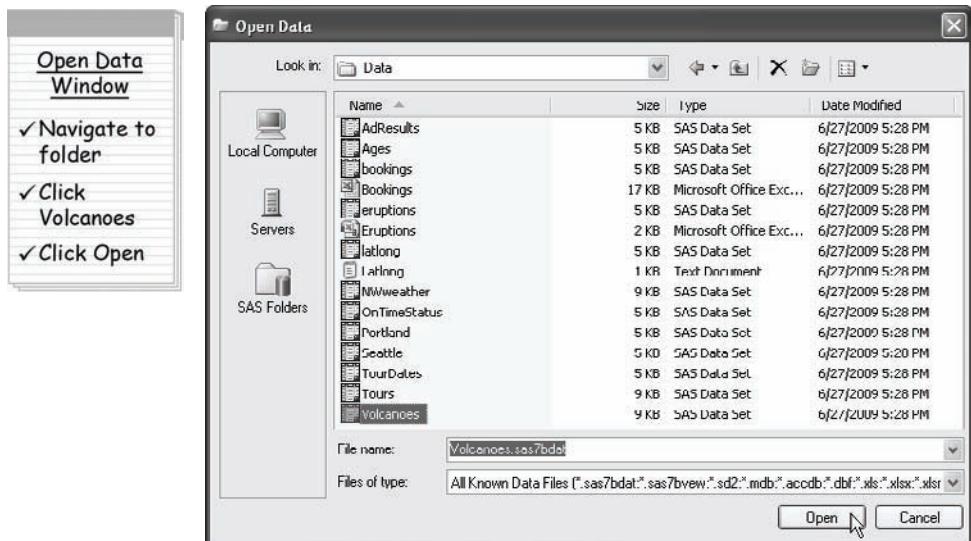


This opens an empty SAS Enterprise Guide window.





Navigate to the location where you stored the Volcanoes file and click on its name to select it.



Click **Open**.

After you open the Volcanoes SAS data table, your screen should look like the following.

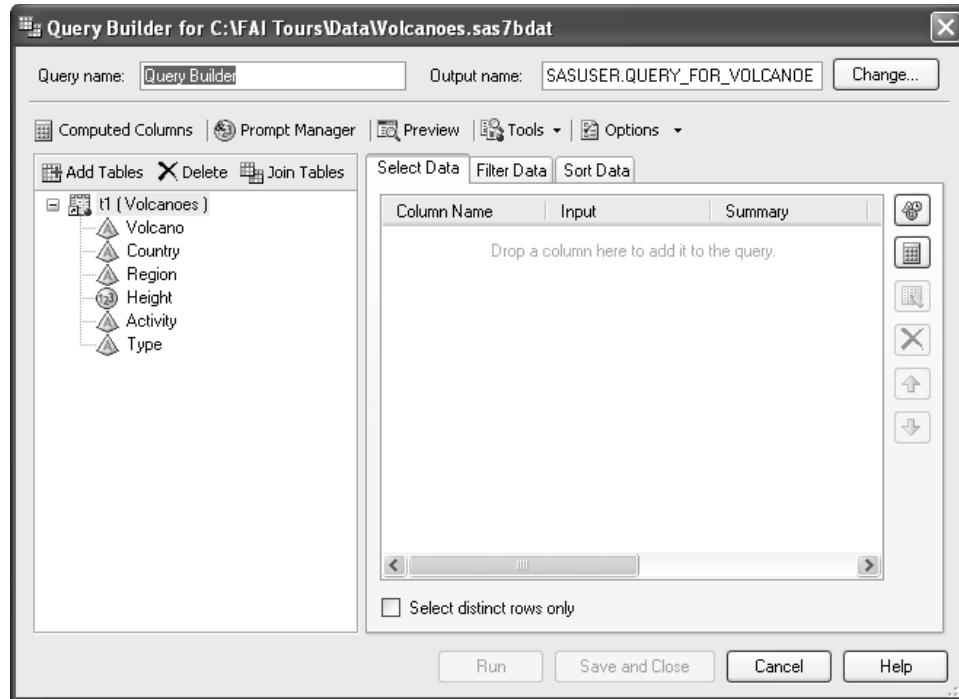
The screenshot shows the SAS Enterprise Guide interface with the 'Volcanoes' data table open. The table contains 25 rows of data with columns: Volcano, Country, Region, Height, and Activity. The 'Query Builder' button is highlighted in the toolbar above the table. The 'Project Tree' on the left shows a single item: 'Volcanoes'. The 'Server List' on the right shows connections to 'Servers', 'OLAP Servers', and 'Private OLAP Servers'.

	Volcano	Country	Region	Height	Activity
1	Altar	Ecuador	SA	5321	Extinct
2	Arthur's Seat	UK	Eu	251	Extinct
3	Barren Island	India	As	354	Active
4	Elbrus	Russia	Eu	5633	Extinct
5	Erebus		An	3794	Active
6	Etna	Italy	Eu	3350	Active
7	Fuji	Japon	As	3776	Active
8	Garibaldi	Canada	NA	2070	
9	Grimsvotn	Iceland	Eu	1725	Active
10	Illimani	Bolivia	SA	6408	Extinct
11	Kenya	Kenya	Af	5199	Extinct
12	Kilauea	USA	AP	1222	Active
13	Kilimanjaro	Tanzania	Af	5855	
14	Kiuchevskoi	Russia	As	4835	Active
15	Krakatau	Indonesia	As	813	Active
16	Lassen	USA	NA	3187	Active
17	Mauna Loa	USA	AP	4170	Active
18	Nyamuragira	DRCongo	Af	3058	Active
19	Nyiragongo	DRCongo	Af	3470	Active
20	Pinalubo	Philippines	As	1486	Active
21	Popocatepetl	Mexico	NA	5426	Active
22	Puy de Dôme	France	Fu	1464	Extinct
23	Reventador	Ecuador	SA	3562	Active
24	Ruapehu	NZ	AP	2797	Active
25					

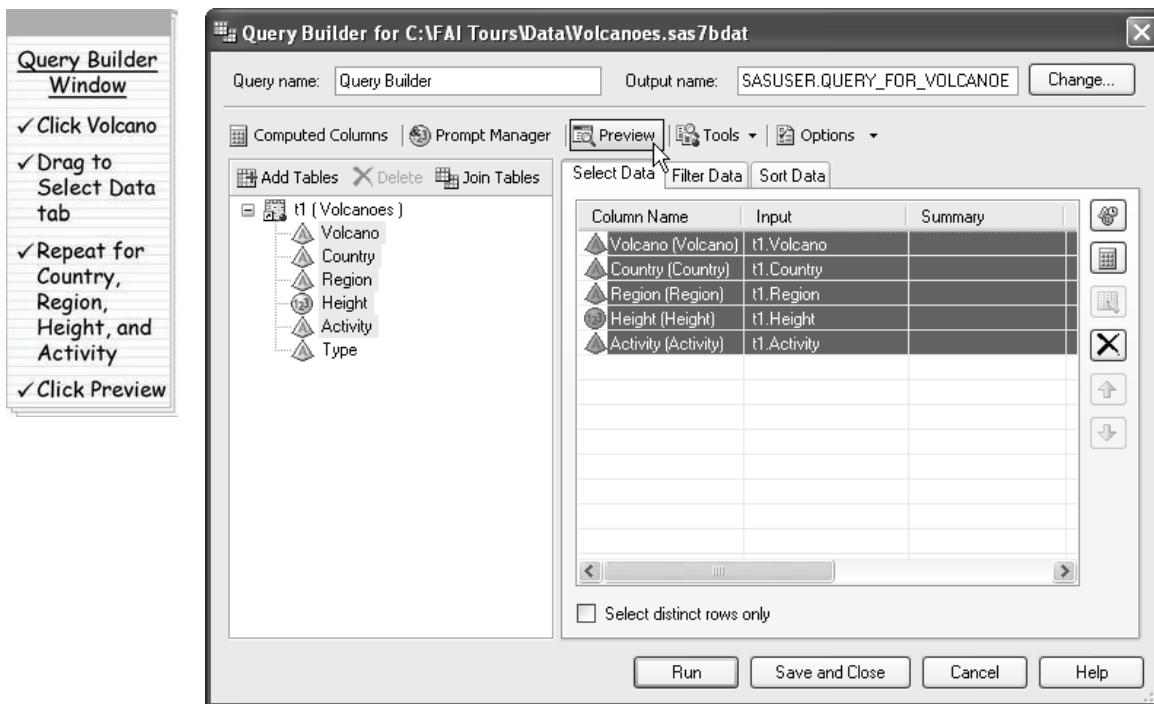
**Opening the Query Builder** The Query Builder is a powerful tool for data manipulation. In the Query Builder, you can filter and sort data, create new columns, and join tables. To open the Query Builder, click **Query Builder** on the workspace toolbar for the Volcanoes data table.

The screenshot shows the SAS Enterprise Guide interface with the 'Volcanoes' data table open. A callout box labeled 'Click Query Builder' points to the 'Query Builder' button in the toolbar. The table data is identical to the one in the previous screenshot.

The Query Builder window has three tabs for different tasks: Select Data, Filter Data, and Sort Data. In addition, there are several buttons including Add Tables, Delete, Join Tables, Computed Columns, and Prompt Manager. So, you can see there is a lot going on in the Query Builder. The name of the active data table appears in the list on the left, along with all the columns in the data table. The Query Builder opens with the Select Data tab on top and no columns selected.



**Selecting columns** To select columns for your query, click the column name in the box on the left and drag it over to the box on the right on the Select Data tab. For this query, select all the columns except Type. You can select them individually, or you can select the whole group at once by clicking Volcano, and then holding down the shift key and clicking Activity. Drag the selected columns to the Select Data tab.

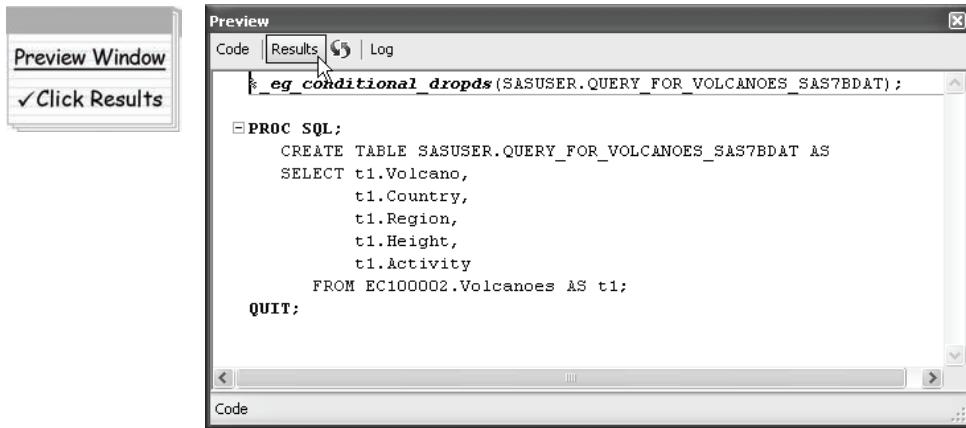


At this point, you could click Run to see the results of this simple query. However, the Query Builder has a Preview window that allows you to see the results, or a sample of the results, without having to exit the Query Builder. To open the Preview window, click **Preview** near the top of the Query Builder window.

#### Alternate Methods for Selecting Columns

In addition to clicking and dragging columns, you can double-click column names to select them. After you double-click it, the column name will appear on the Select Data tab. To select all columns from a data table, click and drag the table name to the Select Data tab.

In addition to showing a preview of the query results, the Preview window can also display the code that the Query Builder generates as well as the SAS log for the query. The log contains notes about how the query ran as well as any warnings or errors. The code and log may be of particular interest to people familiar with SAS programming. Normally you do not need to concern yourself with the code and log.



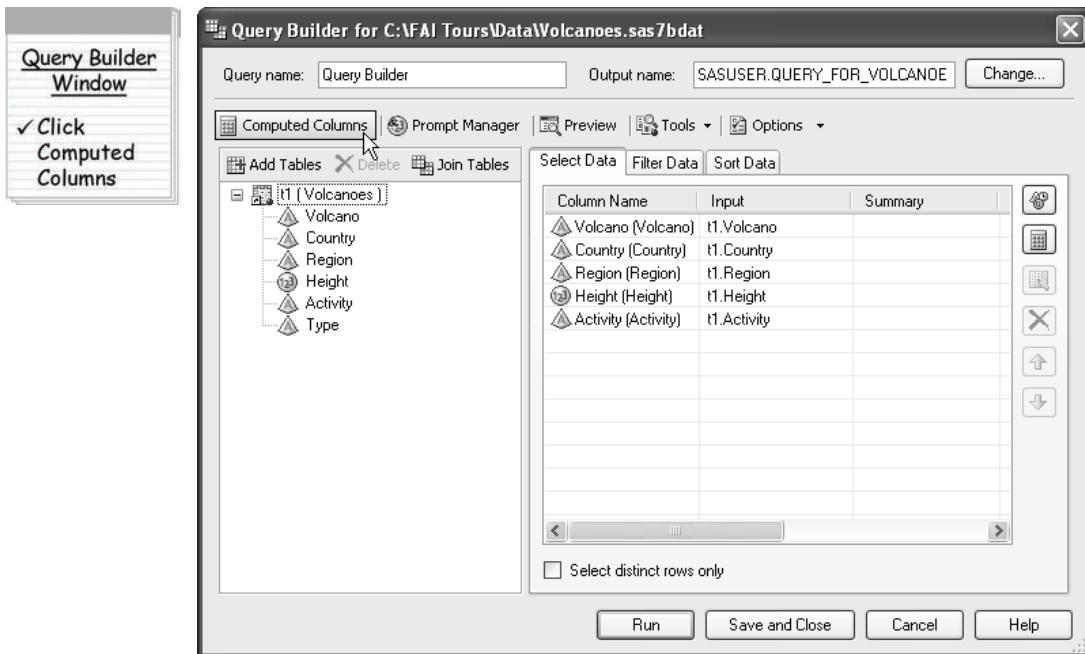
Click **Results** to see a preview of the query results. Notice that all the columns from the Volcanoes data table are in the result except the Type column.

The screenshot shows the SAS Query Builder interface with the 'Results' tab selected in the 'Preview' window. The main area displays a table of volcano data:

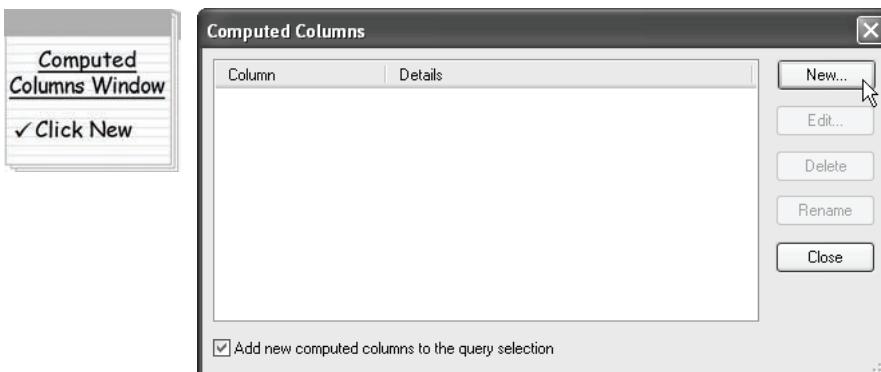
Volcano	Country	Region	Height	Activity
Altar	Ecuador	SA	5321	Extinct
Arthur's Seat	UK	Eu	251	Extinct
Barren Island	India	As	354	Active
Elbrus	Russia	Eu	5633	Extinct
Erebus		An	3794	Active
...	...	...	...	...

You can choose to leave the Preview window open at this time, or you can close it by clicking the **x** in the top right corner of the window. To reopen the Preview window, simply click **Preview** again in the Query Builder window.

**Creating a new column** Sometimes you want to create a new column based on values in an existing column. For example, the Height column in the Volcanoes data table contains the height of each volcano in meters. You can create a new column that uses the values in the Height column to compute a new column containing the height in feet.

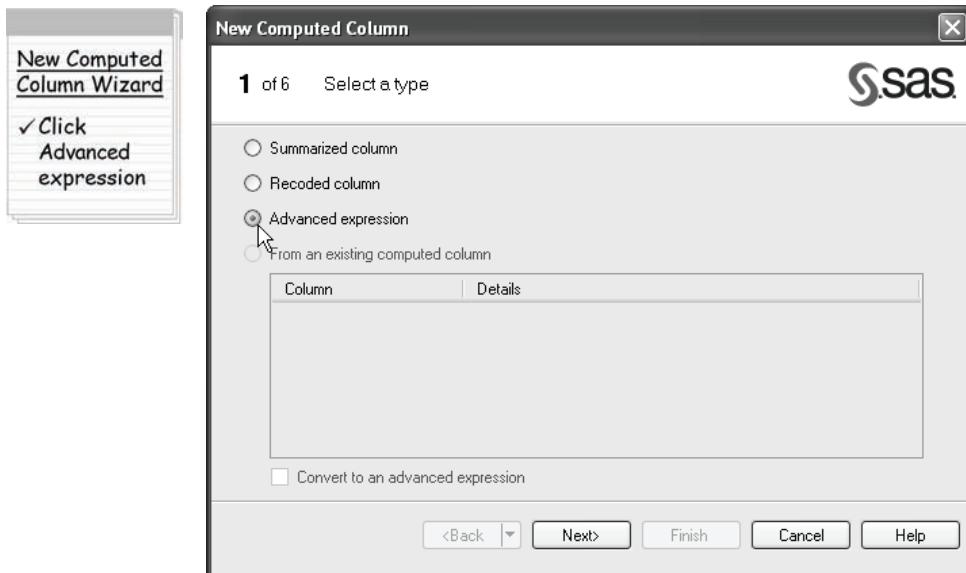


To create a new column that contains the height in feet, click **Computed Columns**. This opens the Computed Columns window where you can create new columns as well as edit, delete, or rename existing computed columns.



To create a new computed column, click **New**.

This opens the New Computed Column wizard. There are four types of computed columns to choose from: Summarized column, Recoded column, Advanced expression, and From an existing computed column (if there are any). Click **Advanced Expression**.



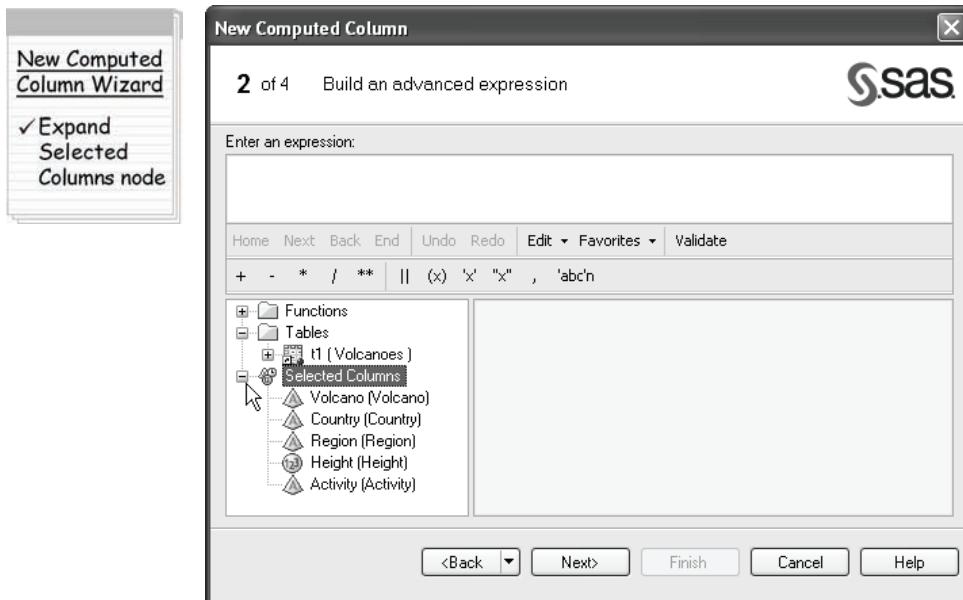
### What Is a Summarized Column?

Use the Summarized column option when you want to compute a summary statistic such as mean, minimum, sum, or count for a column. By default, the chosen statistic is produced for the summarized column for each combination of all other selected columns in the query. To specify which columns to use to group statistics, use the Summary Groups area of the Query Builder window located on the Select Data tab.

### What Is a Recoded Column?

If you create a new column by building an expression, then all values in the new column will be generated using that expression. But what if you want to take an existing column and change only some of the values, or treat a group of values differently from others? For example, the Activity column has some missing values. You could recode those missing values as "Unknown." Or, say you want to group the volcanoes according to height: short, medium, and tall. To do these types of operations, you would choose **Recoded column**.

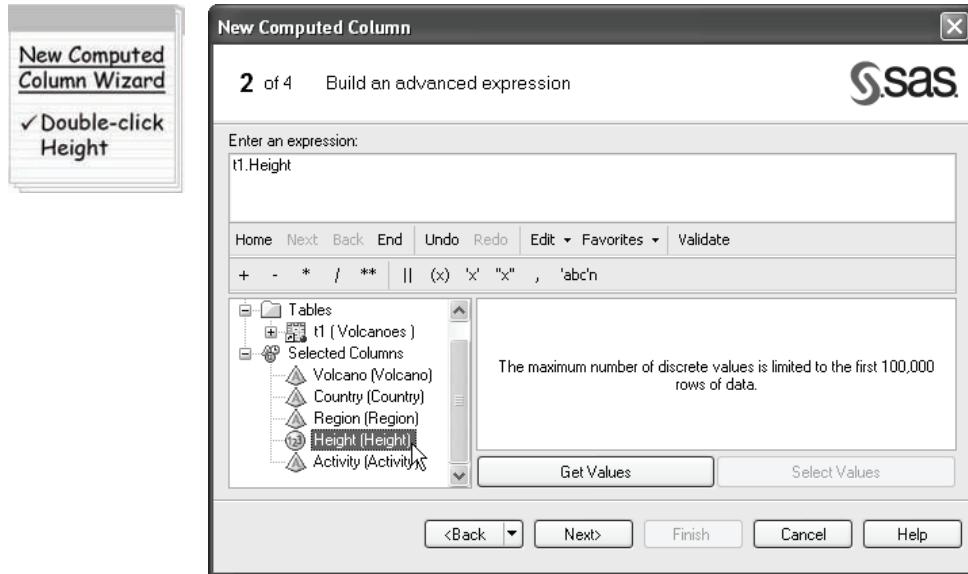
The next window is where you build your expression. The empty box at the top of the window is where the expression is displayed. If you know the expression you want to use, you can type it directly in the box. But, if you are unsure exactly what the expression should look like, you can get some help from SAS Enterprise Guide. Under the box are several mathematical symbols you can add to the expression. Below the symbols are folders for Functions and Tables and a node for Selected Columns. Expand the Selected Columns node by clicking the + symbol located to the left of the Selected Columns icon.



### What Are Functions?

If you find you can't build the expression you want using the simple mathematical operators, then chances are SAS Enterprise Guide has a function that can help. Functions take a value and turn it into another related value. For example, the ABS function takes a number and returns the absolute value of that number. There are hundreds of functions available to you in several categories including: arithmetic, character, mathematical, date, and time.

To calculate the volcano's height in feet, you need to multiply the Height column by 3.25. Double-click **Height** in the Selected Columns list. When you do this, the full name of the Height column is inserted into the expression text box at the top of the window. The full name, t1.Height, includes the source for the column, which is table one (Volcanoes).



Now click the multiplication button under the Expression text box. Notice that the asterisk is inserted after the column name in the Expression text box.

