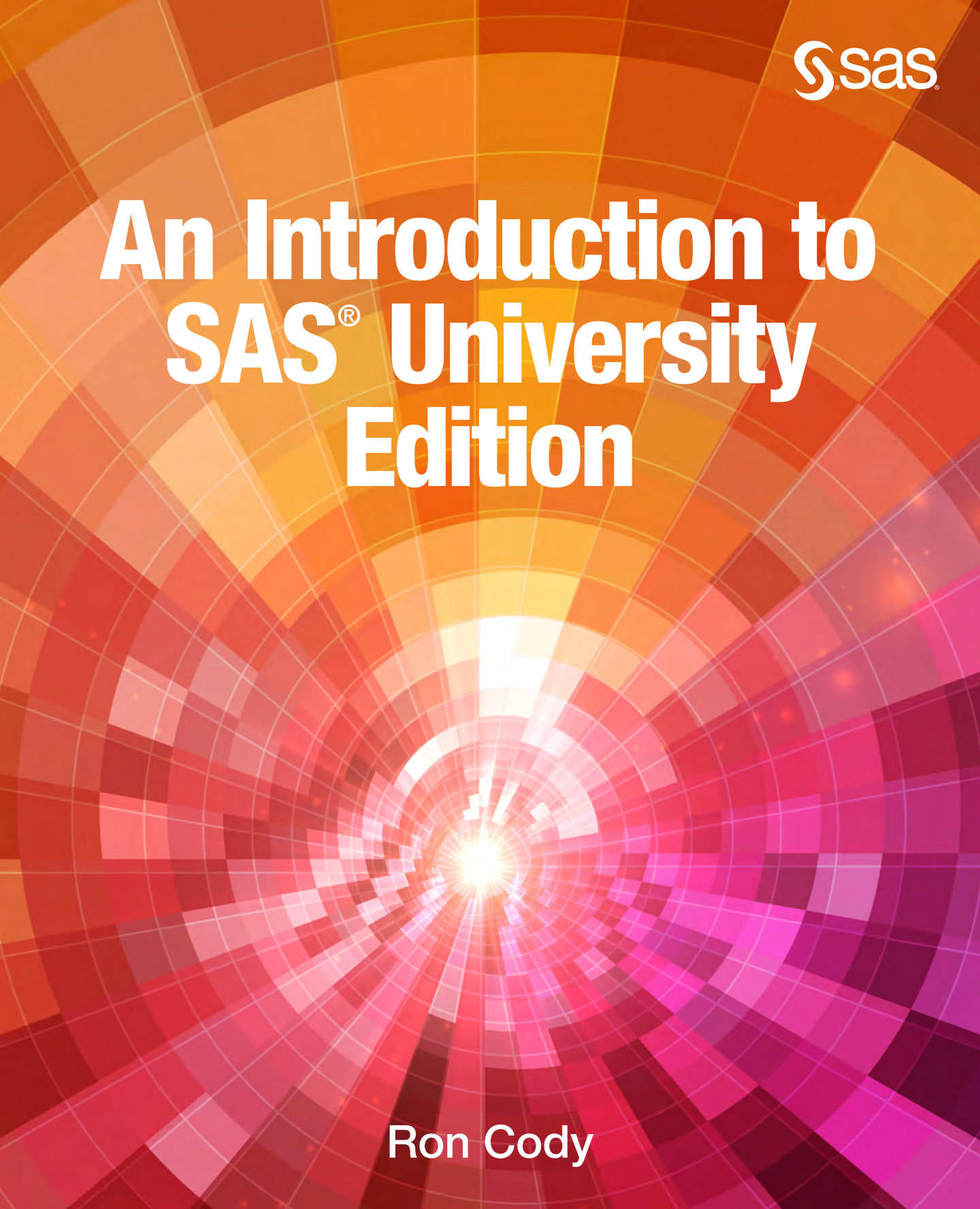
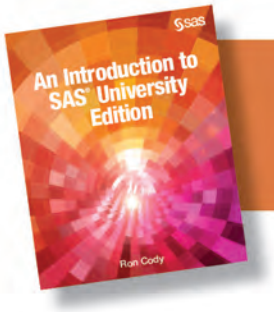

sas
An Introduction to SAS® University Edition
Ron Cody



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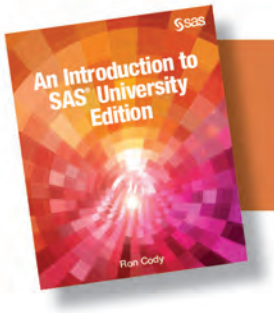

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Introduction

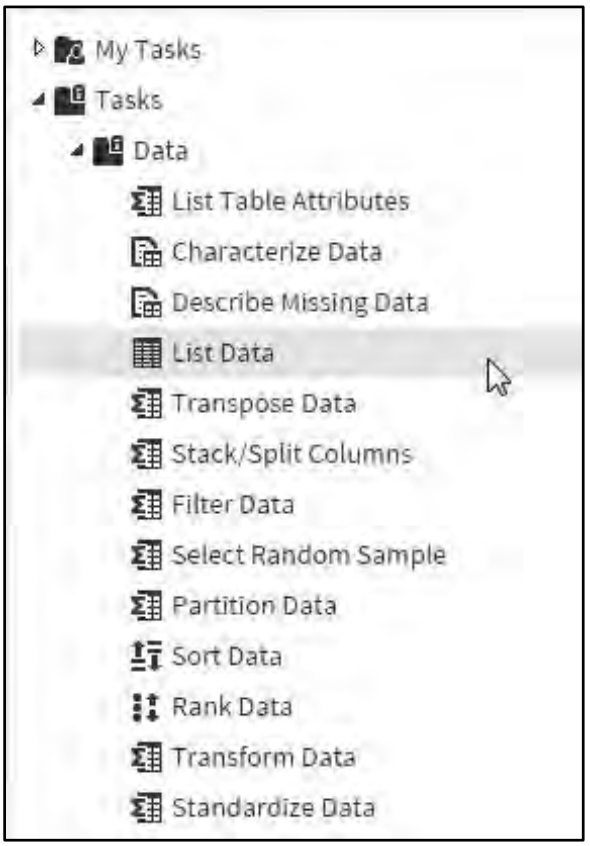
In the last chapter, you saw how to use the **Import Data** facility on the **Utilities** tab to import data. In this chapter, you will see how to use several of the most useful tasks as well as the Query tool on the **Utilities** tab.

> In this book, as well as in SAS Studio, you will see the terms SAS data set and table used interchangeably as well as these other equivalent terms: variables are also called columns and observations are called rows.

Using the List Data Task to Create a Simple Listing

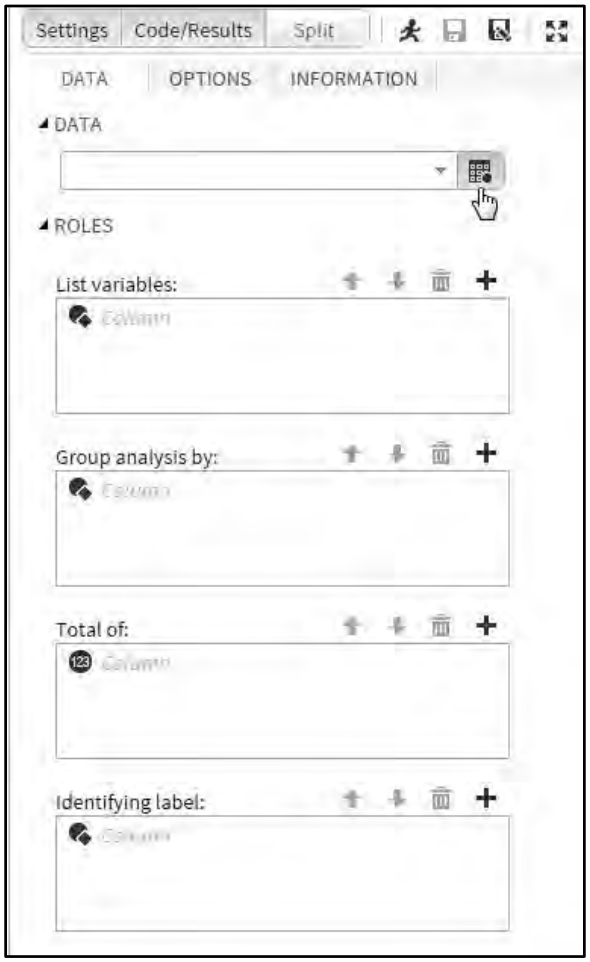
SAS Studio has dozens of built-in tasks. If you expand the **Tasks** tab, you will see the following:

Figure 4.1: Data Tasks



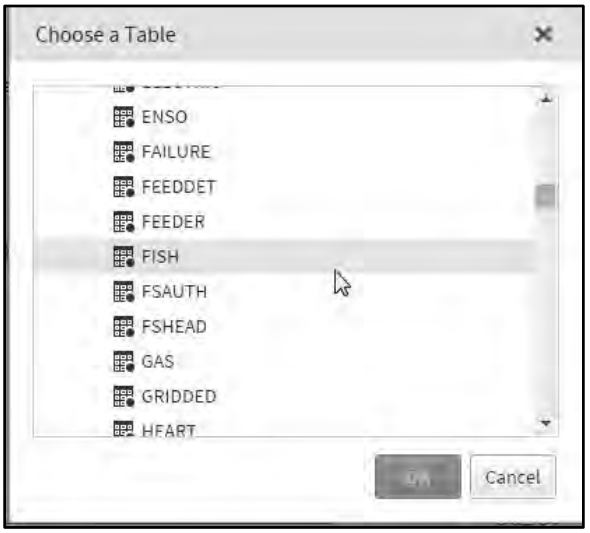
You can use the **List Data** task to create a listing of your data set. To demonstrate this, we are going to use the built-in Sashelp data set called Fish. This data set contains information on several species of fish, including weight, length, and width. To create a listing of this data set, expand the list of **Data** tasks and double-click on **List Data**. This brings up the screen shown in Figure 4.2:

Figure 4.2: The List Data Task Settings Screen



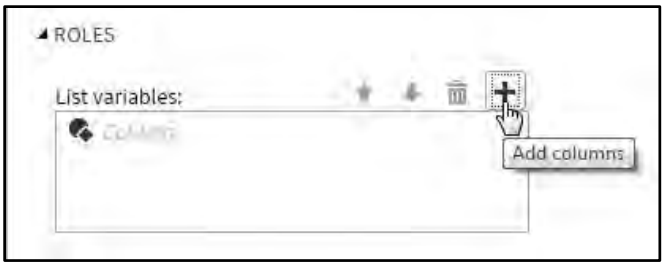
You can click on the icon at the top-right part of this screen to select the library and data set you wish to list. Because you want a listing of Sashelp.Fish, select this data set.

Figure 4.3: Selecting the Fish Data Set in the Sashelp Library



The next step is to click on the plus sign (+) to select which variables you want to include in your listing (see Figure 4.4):

Figure 4.4: Adding Columns (Variables)

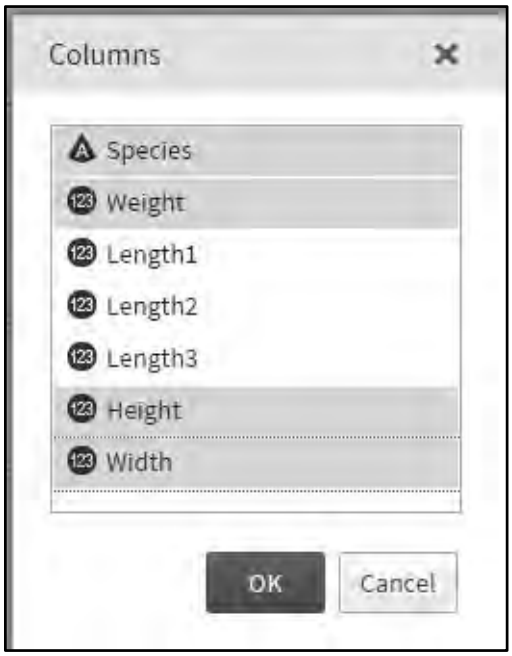


When you see the list of variables, you can select them in the usual way (see the instructions below):

> To select variables from a list, use one of these two methods: 1) Hold the Ctrl key down and select the variables you want; or 2) click on one variable, hold the Shift key down, and click on another variable—all the variables from the first to the last will be selected.

In this example, you are selecting **Species**, **Weight**, **Height**, and **Width**.

Figure 4.5: Selecting Variables to List

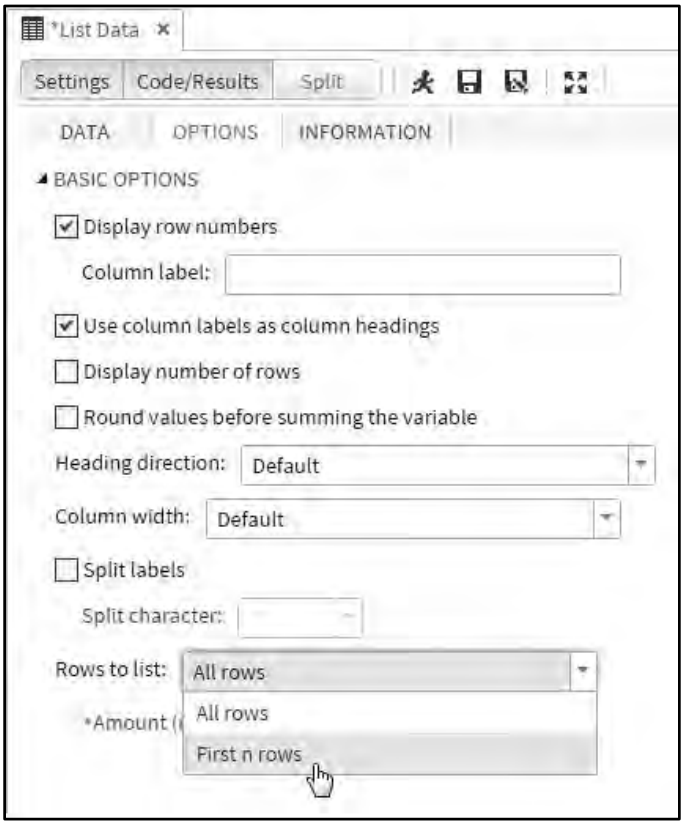


Click **OK** when you are finished. You can create the listing now or click on the **OPTIONS** tab to customize the listing.

Figure 4.6: Using the OPTIONS Tab to Customize the Listing

Here is the list of options available for the **List Data** task:

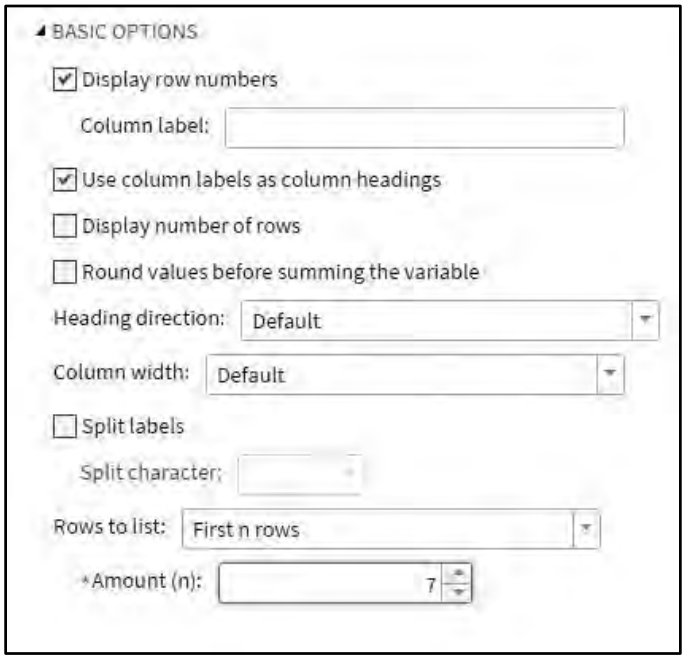
Figure 4.7: Options for the List Data Task



You can check or uncheck the **Display row numbers** box to include the Obs column in the listing or omit it. You have a choice of using column labels or column names in the listing. If you are a programmer, you will probably want to see column names as headings—if you are creating the listing for a report, you will probably want to see column labels.

The option displayed at the bottom of Figure 4.7 gives you the choice of listing all the rows of the table or the first *n* rows. In this example, you want to see the first seven rows of the Fish data set. This is shown in the next figure:

Figure 4.8: Requesting the First Seven Rows to Be Displayed



Clicking on the **Run** icon generates the following listing:

Figure 4.9: Listing of the First Seven Rows of the Fish Data Set

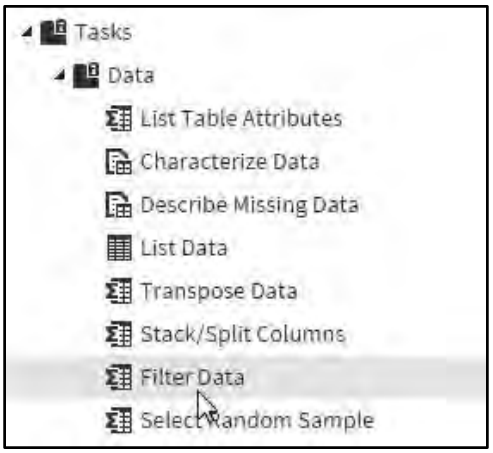
List Data for SASHELP.FISH

Obs	Species	Weight	Height	Width
1	Bream	242	11.5200	4.0200
2	Bream	290	12.4800	4.3056
3	Bream	340	12.3778	4.6961
4	Bream	363	12.7300	4.4555
5	Bream	430	12.4440	5.1340
6	Bream	450	13.6024	4.9274
7	Bream	500	14.1795	5.2785

Filtering Data

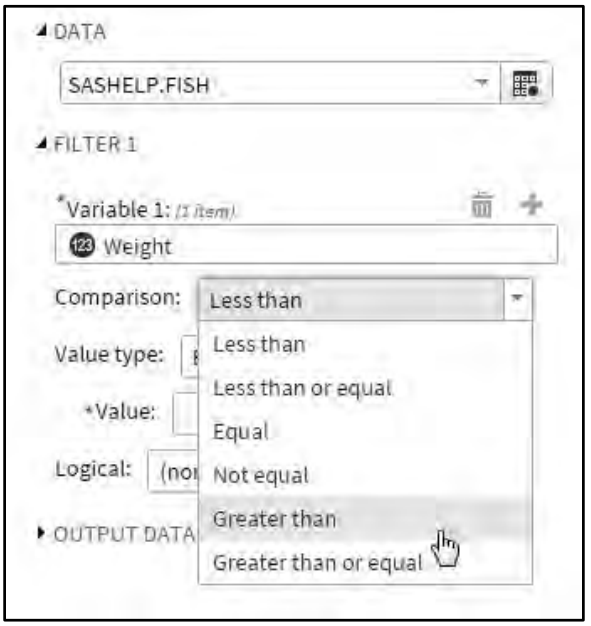
Another useful task is to filter the table—that is, you select rows that meet predefined criteria. To do this, double-click on **Filter Data** in the task list.

Figure 4.10: Selecting Filter Data from the Task List



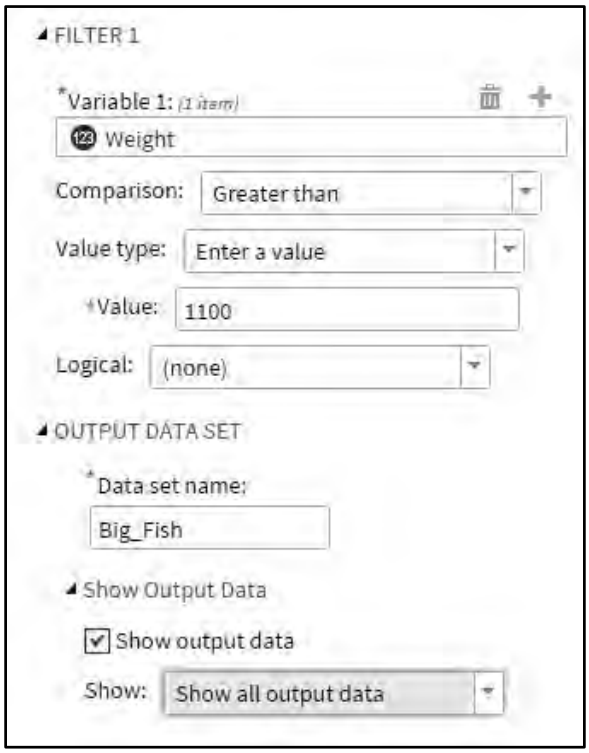
This brings up the following:

Figure 4.11: Selections for Filtering Data



You select the data set as before. Next, you select a variable and a condition for your filter. In this example, you are selecting **Weight** as your variable and **Greater than** as your condition. You can now enter a value for the filter. In this example, you want to see rows in the table where the variable Weight is greater than 1,100.

Figure 4.12: Selecting Rows Where the Weight Is Greater Than 1,100



You can also expand the **OUTPUT DATA SET** option to override a default data set name. In most cases, you will want to supply your own data set name. Here you are naming the data set Big_Fish. You can also check or uncheck the **Show Output Data** box. Selecting it (as in this example) generates a listing of the filtered data set:

Figure 4.13: Listing of the Filtered Data Set (Big_Fish)

Filtered data set - WORK.Big_Fish

Obs	Species	Weight	Length1	Length2	Length3	Height	Width
1	Pike	1250	52	56.0	59.7	10.6863	6.9849
2	Pike	1600	56	60.0	64.0	9.6000	6.1440
3	Pike	1550	56	60.0	64.0	9.6000	6.1440
4	Pike	1650	59	63.4	68.0	10.8120	7.4800

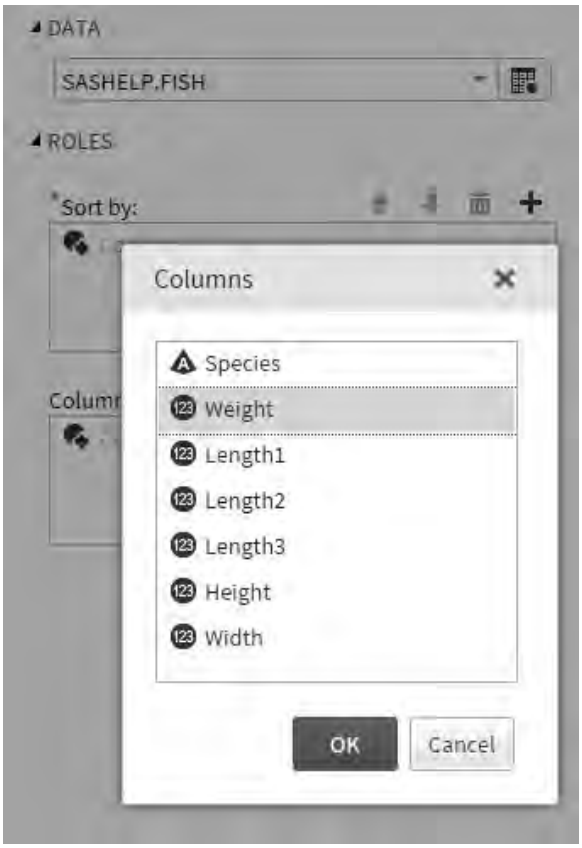
Sorting Data

To sort data, select **Sort Data** from the list:

Figure 4.14: The Sort Data Task

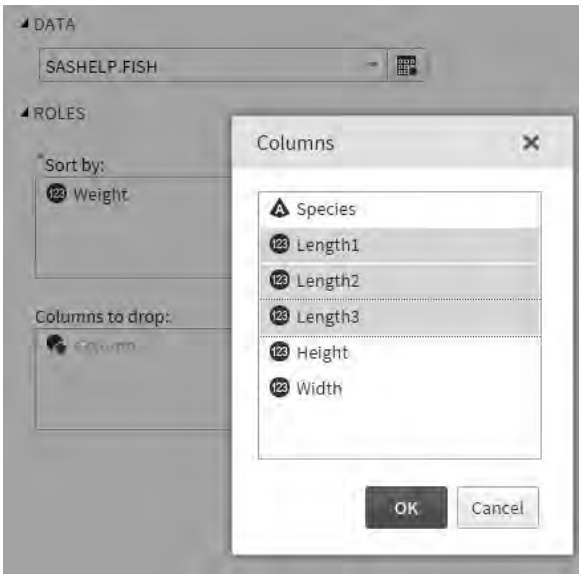
Just as in the previous tasks, you can now choose a data set and options.

Figure 4.15: Selecting a Data Set and Variables for the Sort



You are starting with the Sashelp.Fish data set and requesting a sort based on the variable Weight. You can also choose columns to drop:

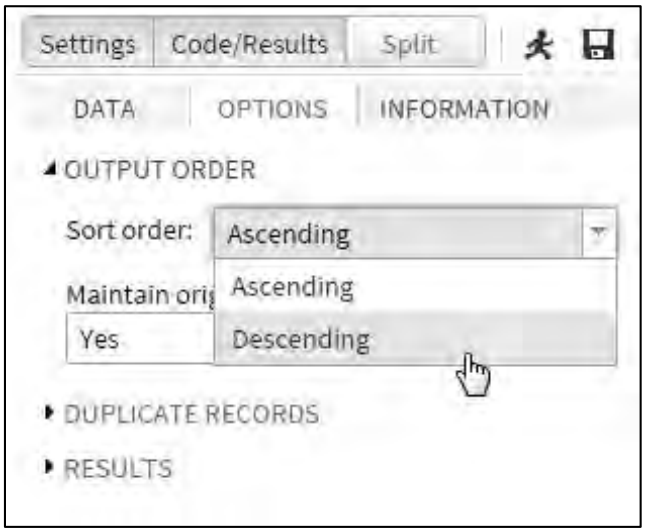
Figure 4.16: Selecting Columns to Drop



You are dropping the three Length variables.

Before you execute the sort, there are several options you should consider. The default sort order is ascending (from smallest to largest). In this case, you want to see the heavier fish at the top of the list, so you choose **Descending** as the sort order.

Figure 4.17: Selecting a Descending Sort

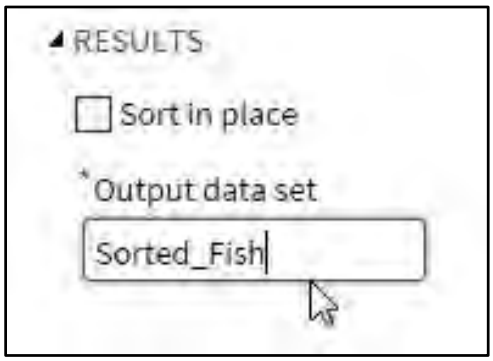


Expand the **RESULTS** option to either sort in place or create a new data set with the sorted data.

> CAUTION: Sorting in place replaces the original data set with the sorted data. If you drop columns, they will no longer be in the sorted data set.

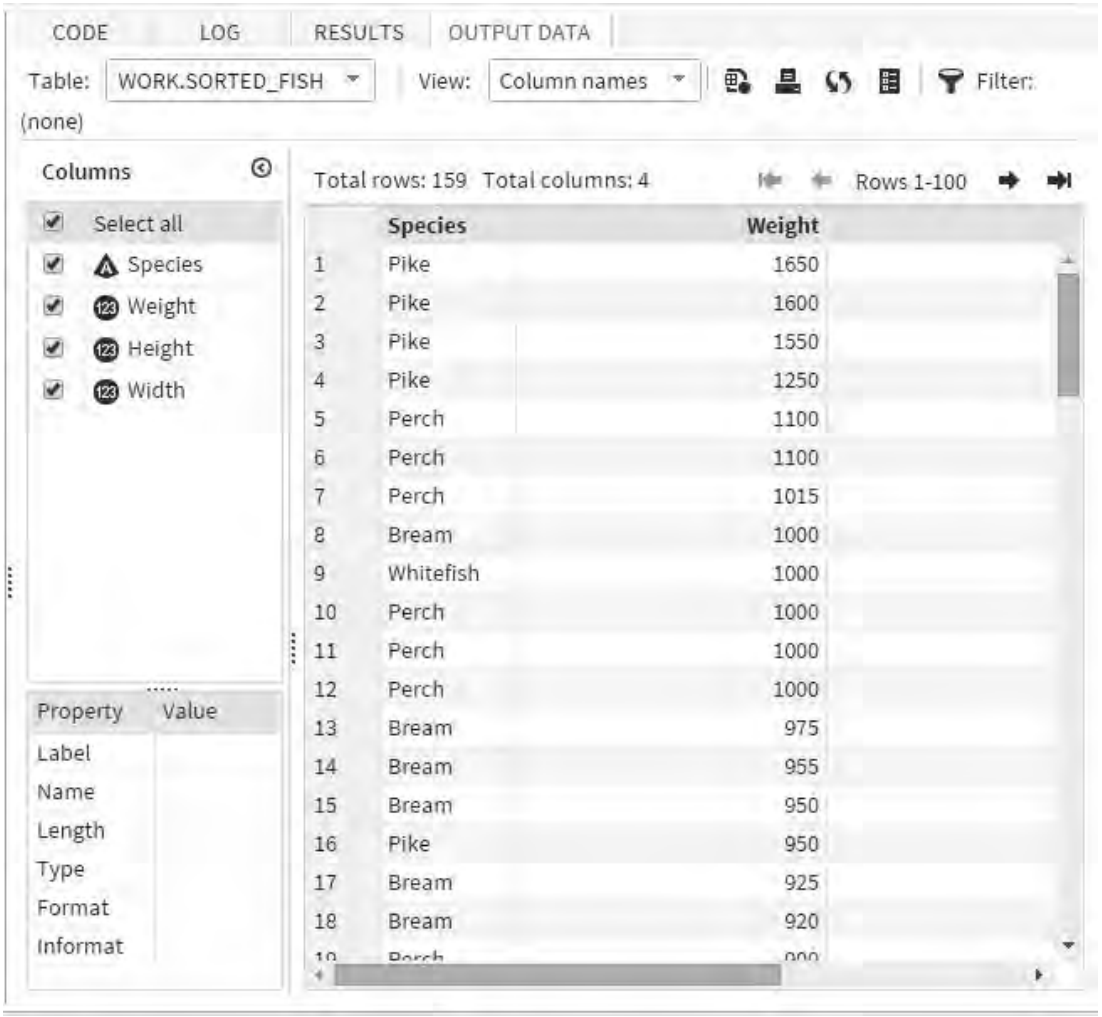
In this example, you want to create a new data set called Sorted_Fish:

Figure 4.18: Naming the Output Data Set



Click on the **Run** icon to see the following screen:

Figure 4.19: Result of Executing the Sort



	Species	Weight
1	Pike	1650
2	Pike	1600
3	Pike	1550
4	Pike	1250
5	Perch	1100
6	Perch	1100
7	Perch	1015
8	Bream	1000
9	Whitefish	1000
10	Perch	1000
11	Perch	1000
12	Perch	1000
13	Bream	975
14	Bream	955
15	Bream	950
16	Pike	950
17	Bream	925
18	Bream	920

To see a nicer listing of this data set, go back to the **List Data** selection and proceed as you did in the first section of this chapter. Once you have opened the **List Data** task, choose a table to display and any options that you want.

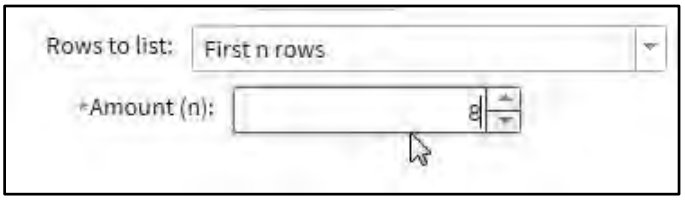
Figure 4.20: Choose a Table to List

Next, choose which variables to include in the listing.

Figure 4.21: Choosing Variables to List

Finally, select any options that you want. In this example, you want to see the first eight rows of the table.

Figure 4.22: Option to List the First Eight Rows of the Table



Here is the listing:

Figure 4.23: First Eight Rows of the Sorted_Fish Data Set

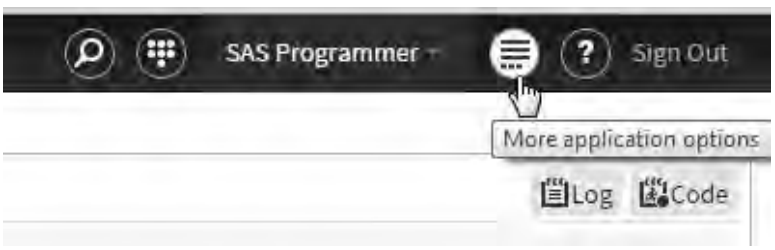
List Data for WORK.SORTED_FISH

Obs	Species	Weight	Height	Width
1	Pike	1650	10.8120	7.4800
2	Pike	1600	9.6000	6.1440
3	Pike	1550	9.6000	6.1440
4	Pike	1250	10.6863	6.9849
5	Perch	1100	12.8002	6.8684
6	Perch	1100	12.5125	7.4165
7	Perch	1015	12.3808	7.4624
8	Bream	1000	18.9570	6.6030

Outputting PDF and RTF Files

If you want either PDF or RTF (rich text format) output, first click on the SAS Studio **Options** icon.

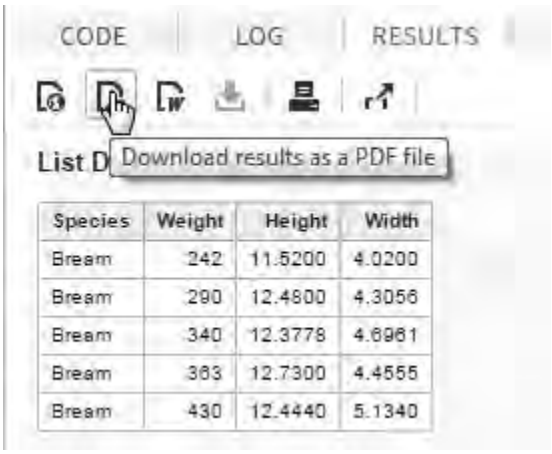
Figure 4.24: Click on More Application Options



Click on **Preferences**, then **Results**, and then check or uncheck **PDF** and/or **RTF**. (Note: These preferences will remain in effect unless you change them later.)

If you have checked one of these file types, after you produce a listing, the two icons **Download results as a PDF file** or **Download results as an RTF file** will be displayed right above your listing (see Figure 4.25). Clicking on either of these icons will output the appropriate file type to a location of your choice.

Figure 4.25: Downloading a PDF File



Species	Weight	Height	Width
Bream	242	11.5200	4.0200
Bream	290	12.4800	4.3056
Bream	340	12.3778	4.6961
Bream	363	12.7300	4.4555
Bream	430	12.4440	5.1340

Here is a listing of the PDF file:

Figure 4.26: Listing of the PDF File

List Data for SASHELP.FISH

Species	Weight	Height	Width
Bream	242	11.5200	4.0200
Bream	290	12.4800	4.3056
Bream	340	12.3778	4.6961
Bream	363	12.7300	4.4555
Bream	430	12.4440	5.1340

Joining Tables (Using the Query Window)

The last topic in this chapter describes how to use the **Query** utility to join two tables. Two data sets, ID_Name and Grades, were created to explain how the joining process works. Here is a listing of these two data sets:

Figure 4.27: Listing of Data Sets ID_Name and Grades

List Data for WORK.ID_NAME

ID	Name
001	Ron
002	Jan
003	Peter
004	Paul
005	Mary

List Data for WORK.GRADES

ID	Grade1	Grade2	Grade3
005	78	80	82
002	100	90	95
001	99	95	98
006	65	67	69
004	85	86	84

There are several features of these two data sets that are important for you to notice. First, the ID variable in the ID_Name data set is in order—in the data set Grades, it is not. As you will see, this does not cause a problem—the Query tool automatically sort the data sets. Also, ID 003 is in data set ID_Name and not in data set Grades; ID 006 is in Grades but not in ID_Name. The goal is to join these two tables based on the ID column.

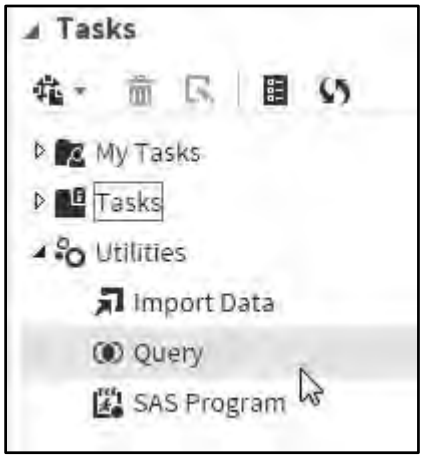
If you want to play along with this demonstration, you can run the program shown next to create these two tables (you may need to refer to the programming chapters to see how to do this):

Figure 4.28: Program to Create Data Sets ID_Name and Grades

```
data ID_Name;
   informat ID $3. Name $12.;
   input ID Name;
datalines;
001 Ron
002 Jan
003 Peter
004 Paul
005 Mary
;
data Grades;
   informat ID $3.;
   input ID Grade1-Grade3;
datalines;
005 78 80 82
002 100 90 95
001 99 95 98
006 65 67 69
004 85 86 84
;
```

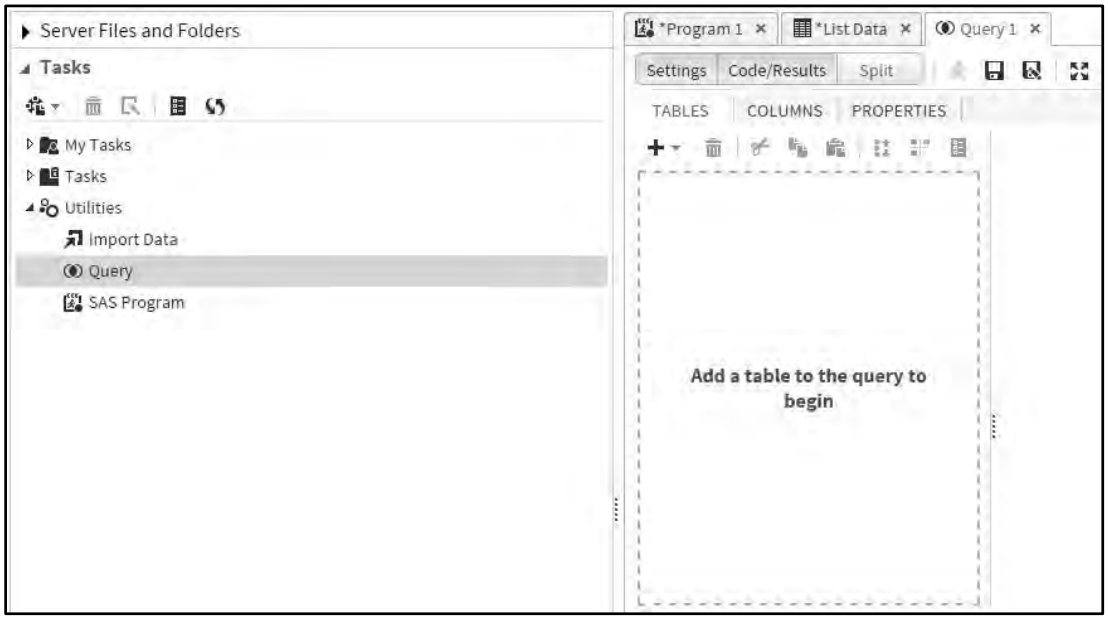
The first step in joining these two tables is to select **Query** from the **Utilities** tab.

Figure 4.29: The Query Task in the Utilities Tab



This brings up the following screen:

Figure 4.30: The Query Window

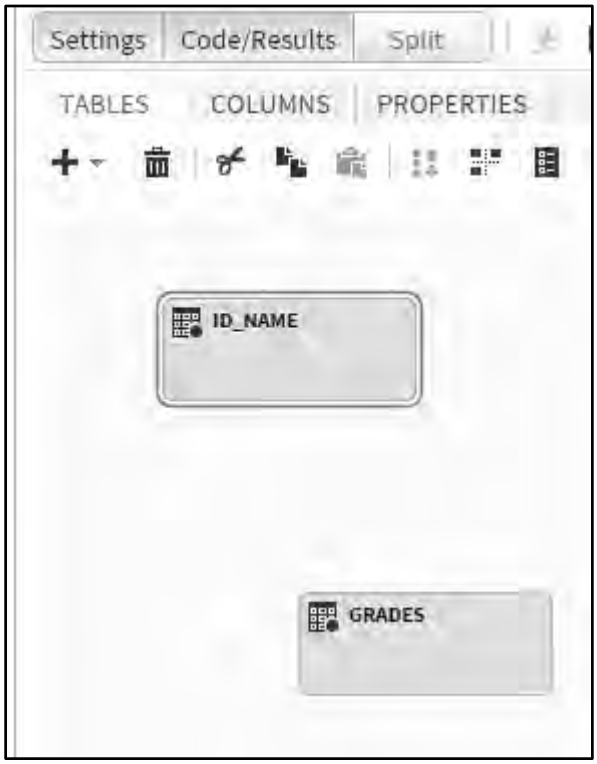


The next step is to open the **Libraries** tab and find the **Work** library.

Figure 4.31: Locate the Two Tables in the Work Library

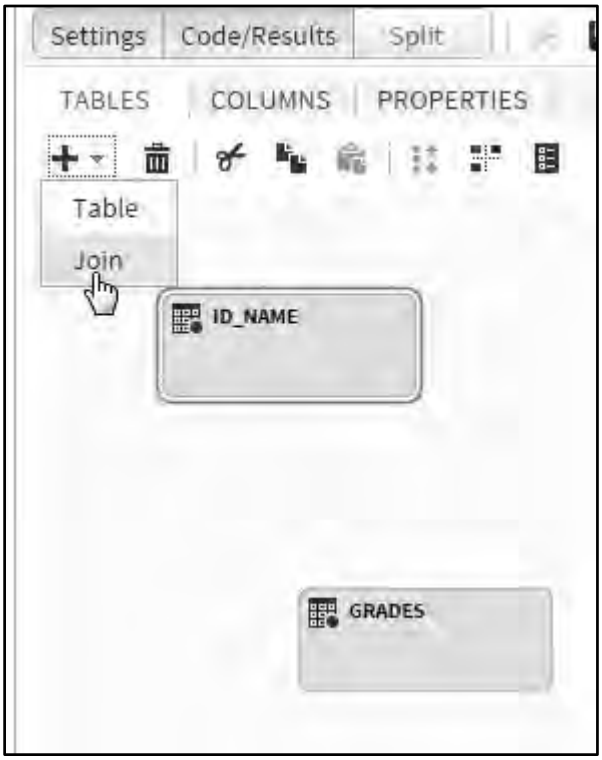
Left-click on each file and drag it into the Query window. (If you drag the second file on top of the first file, SAS Studio automatically assumes that you want to perform a join operation.)

Figure 4.32: Drag the Two Files into the Query Window



In the pull-down menu on the **TABLES** tab, select **Join** (unless you dragged the second file on top of the first, in which case the Query tool assumes that you want a join).

Figure 4.33: Selecting Join in the Pull-down Menu



This brings up the following screen:

Figure 4.34: Getting Ready to Join the Two Tables

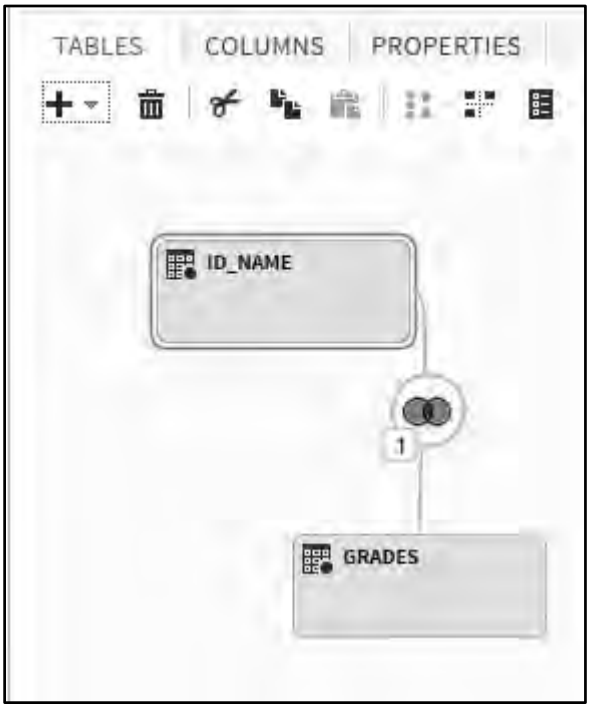
Select **ID_Name** for the **Left table** and **Grades** for the **Right table**. For **Join type**, select **Inner join**.

Figure 4.35: Selecting the Two Tables and Inner Join

Click **Save**. You now see the two tables with a Venn diagram that represents an inner join. If you are familiar with SQL, you already know the four types of joins. For those readers who are not, here is the explanation:

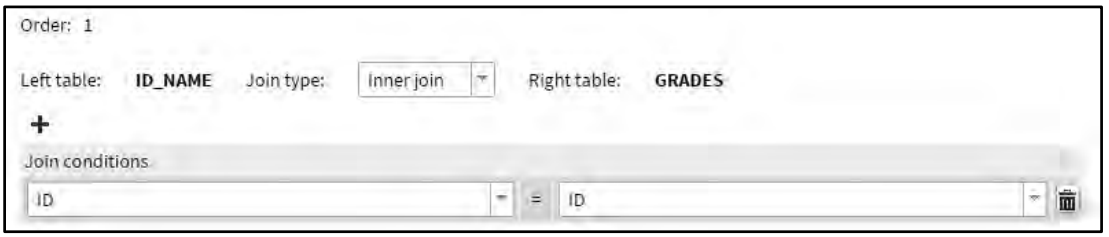
Because some IDs are only in one table, you have some decisions to make about how you want to handle the join. The most common join, selected in this example, is an *inner join*. This type of join includes only those rows where there is a matching ID in both files. An *outer join* includes all rows from both tables (with missing values in the rows from the table that does not contain an ID). Finally, the other two joins are a *left join* and a *right join*. In a left join, all IDs from the left table are included—in a right join, all IDs from the right table are included.

Figure 4.36: Venn Diagram Showing an Inner Join of the Two Tables



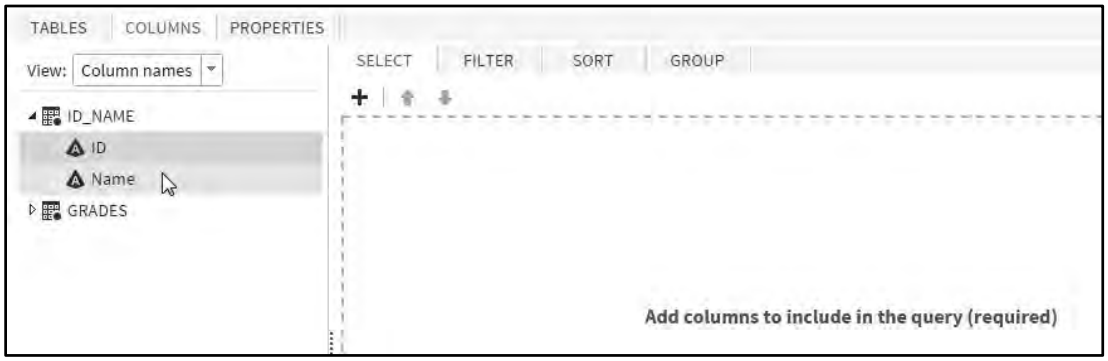
The next step is to name the columns that you want to use to join the tables. In this example, because ID is in both tables, the Query tool automatically selects ID for the join variables. You are free to select any variable from each file to construct the join, even if the variable names are not the same in the two files.

Figure 4.37: Selecting the Join Conditions



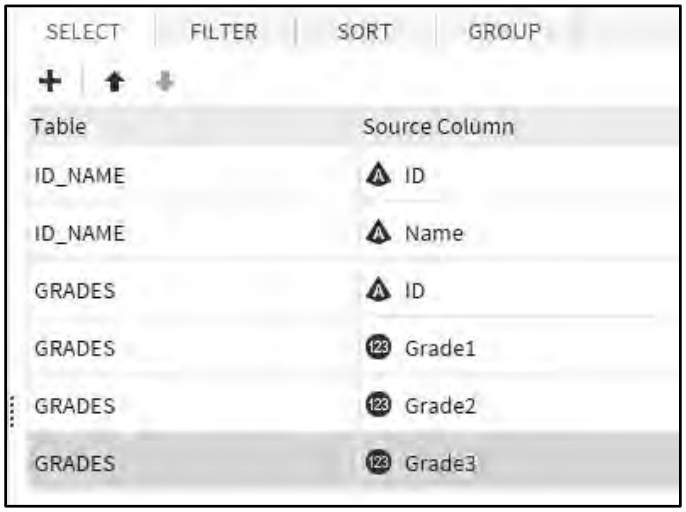
Next, select which columns you want in the joined table. To do this, click on the **COLUMNS** tab. Select the columns in the usual way, and drag them to the Add columns area.

Figure 4.38: Selecting Columns for the Final Table



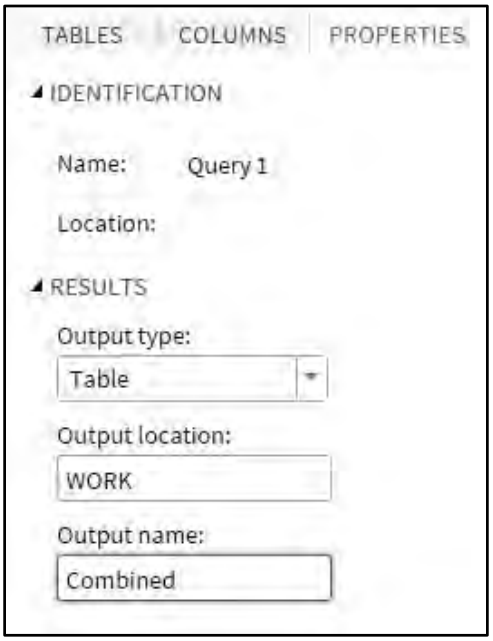
The figure below shows the final list of columns in the joined table.

Figure 4.39: Variables in the Joined Table



The last step is to click on the **PROPERTIES** tab and indicate if you want a table or a report. If you choose a table, you can name the location (the Work library in this example) and the table name.

Figure 4.40: Options in the PROPERTIES Tab



Clicking on the **Run** icon finishes the join. A snapshot view of the resulting table is produced.

Figure 4.41: View of the Resulting Table

You can use the **List Data** task to create a listing of the resulting table. It is shown in Figure 4.42:

Figure 4.42: Listing of Combined Data Set

Listing of Data Set COMBINED

ID	Name	ID2	Grade1	Grade2	Grade3
005	Mary	005	78	80	82
002	Jan	002	100	90	95
001	Ron	001	99	95	98
004	Paul	004	85	86	84

Because this was an inner join, only those IDs that were in both tables are listed in the final table.

Conclusion

Only a few of the more popular data tasks were described in this chapter. Once you get the knack of running a task, you should feel confident in trying out some of the other data tasks in the list. The decision to use a task or write a SAS program is a personal choice. For those with programming experience, writing a program may be the way to go—for those folks who are new to SAS and just want to get things done, using the tasks is a great way to go. Or you can do both! Use a task or a utility to get the basic program written for you, and then take that and edit it to do more.

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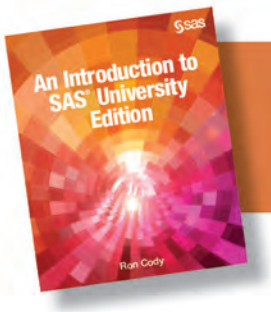

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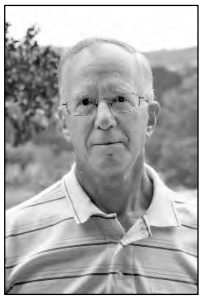

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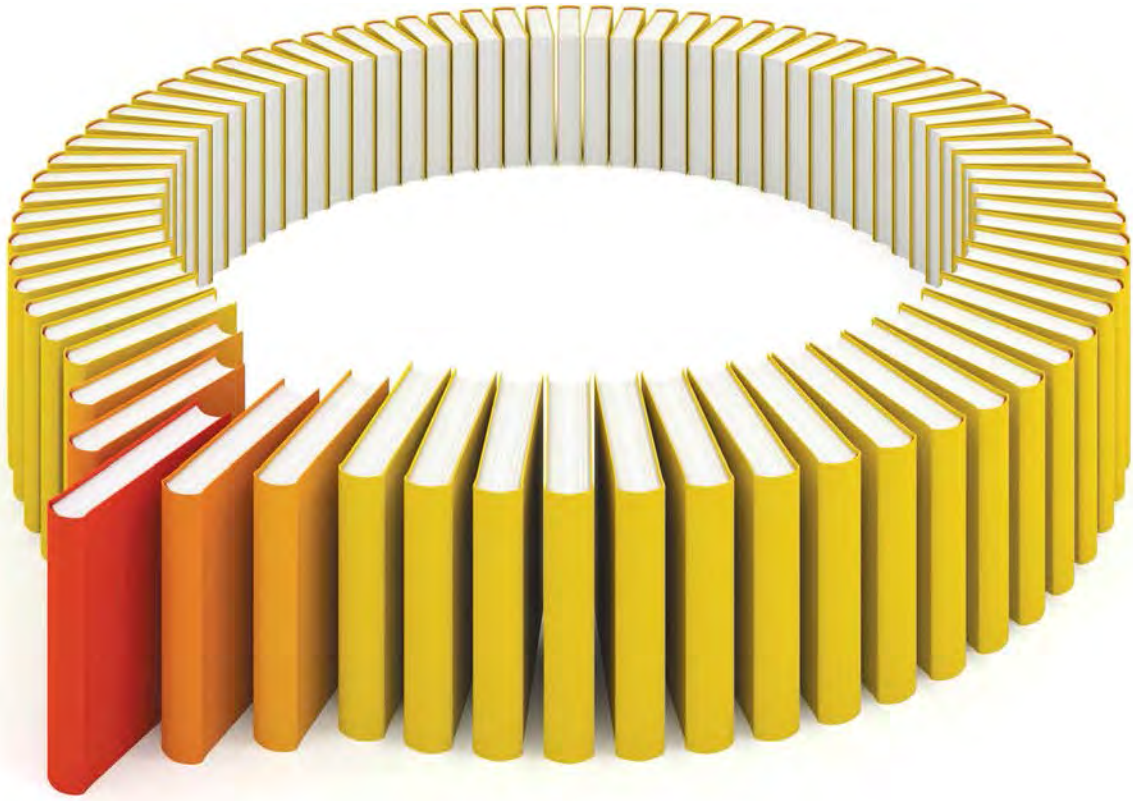

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