CSPro Getting Started Guide

Version 7.2.1

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CSPro Getting Started Guide

Introduction

What is CSPro?

The **C**ensus and **S**urvey **Pro**cessing System (CSPro) is a software package for entry, editing, tabulation, and dissemination of census and survey data. CSPro combines the features of the Integrated Microcomputer Processing System (IMPS) and the Integrated System for Survey Analysis (ISSA).

CSPro lets you create, modify, and run data entry, batch editing, and tabulation applications in a single, integrated development environment. It processes data on a case basis (one or more questionnaires), where a case can consist of one or many data records. The data are stored in files described by data dictionaries. CSPro contains a powerful common procedure language to implement data entry control and edit rules.

CSPro also provides tools to view data and other text files, to view tables and thematic maps created by CSPro, to convert IMPS and ISSA data dictionaries to and from CSPro, and to convert ERSI shape files (maps) to CSPro map files.

CSPro was developed jointly by the U.S. Census Bureau, ICF International, and Serpro, S.A., with major funding from the U.S. Agency for International Development.

CSPro is in the public domain. It is available at no cost and may be freely distributed. It is available for download at www.census.gov/data/software/cspro.html.

This guide contains information about installing and uninstalling CSPro, followed by a tutorial that will guide you through a series of exercises to help you get started using CSPro.

CSPro Features

This is an overview of some of CSPro's main capabilities. You can also view information about CSPro's tools.

Data Entry

Add, modify, verify and view cases (questionnaires). Create an unlimited number of forms (screens). Create forms bigger than the computer screen that scroll as necessary. Create forms with fields from different physical records. Enter data from rosters. Create consistency checks and skip patterns of unlimited complexity. Execute procedures before and/or after field is entered. Display user-defined messages. Access multiple lookup files. Read from and write to secondary files. Index cases to avoid duplication. Produce operator statistics. Create a stand-alone data entry environment.

Batch Editing

Identify and report structure, value, and consistency errors in questionnaire data. Change (impute) data values based on simple or complex methods. Produce summary or detailed reports of errors and corrections. Access multiple lookup files. Read from and write to secondary files.

Tabulation

Define and select variables to tabulate. Select the universe of tabulation. Tabulate values and weights. Format tabulations for viewing or printing. Save tabulations in several formats. Copy tables to spreadsheets or word-processing documents. Produce tables by geographic area. Map results by geographic area.

Data Dictionary

Define simple or complex hierarchical file organization. Define hierarchical levels, identification items, records, items (fields or variables), value sets (categories of values), and values. Create descriptive notes for documentation. Define multiply occurring items and define relationships between multiply occurring records and items. Produce reports of file organization.

Installation

Hardware and Software Requirements

The minimal configuration for CSPro is:

- Pentium processor
- 512MB of RAM
- SVGA monitor
- Mouse
- 100MB of free hard drive space
- Microsoft Windows Vista, 7, 8, or 10

Installing CSPro

The CSPro installer has the file name **cspro72.exe**. To install CSPro:

1. Double-click on the file.
2. Read and accept the U.S. Census Bureau's license agreement
3. Select the components that you want to install. You will generally want to install all of the components.
4. Select the folder where you want to install CSPro. You will generally want to install CSPro in the suggested directory.

After CSPro has been installed on your computer, you will have the option to run the program and/or view the release notes.

You will find a CSPro 7.2 icon on your desktop that you can double-click on when you want to run CSPro in the future.

Installing a Newer Version

Upgrading to CSPro 7.2 From CSPro 7.1 or Earlier

If you have an old version of CSPro installed on your computer, you can install CSPro 7.2 without affecting the previous version. When you have finished your conversion of applications to CSPro 7.0, you can then uninstall the previous version.

Due to internal changes within CSPro 7.2, once files have been loaded in CSPro 7.2, you may no longer be able to load them in previous versions of CSPro.

Updating a Previous Version of CSPro 7.2

If you are updating a previous version of CSPro 7.2, the installer will remove the previous version and replace it with the new version. It will not change any applications or other files that you have created.

Uninstalling CSPro

There are two ways to uninstall CSPro. The uninstaller will remove all registry entries and CSPro system files. It will not

remove any applications or other files that you have created.

You can uninstall the program using the Windows Control Panel:

1. Using the Windows search functionality (**Windows Key+S**), type **Add or remove programs**.
2. Select CSPro from the list of programs.
3. Follow the prompts to uninstall the program.

Alternatively, you can:

1. Use Windows Explorer to browse to the CSPro application folder, which will likely be: **C:\Program Files (x86)\CSPro 7.2**.
2. Run the program **uninstall.exe**.
3. Follow the prompts to uninstall the program.

CSPro Tutorial

About the Tutorial

The tutorial will guide you through a series of exercises to help you get started using CSPro.

The exercises in the tutorial require no special knowledge other than basic familiarity with Windows. The exercises are divided into very short steps. Each step normally takes only a few minutes.

There are eight exercises. You will files in each exercise that are used in later exercises. Exercises 1 through 6 show you simple data entry and cross tabulation. Exercises 7 and 8 show you the CSPro language for editing.

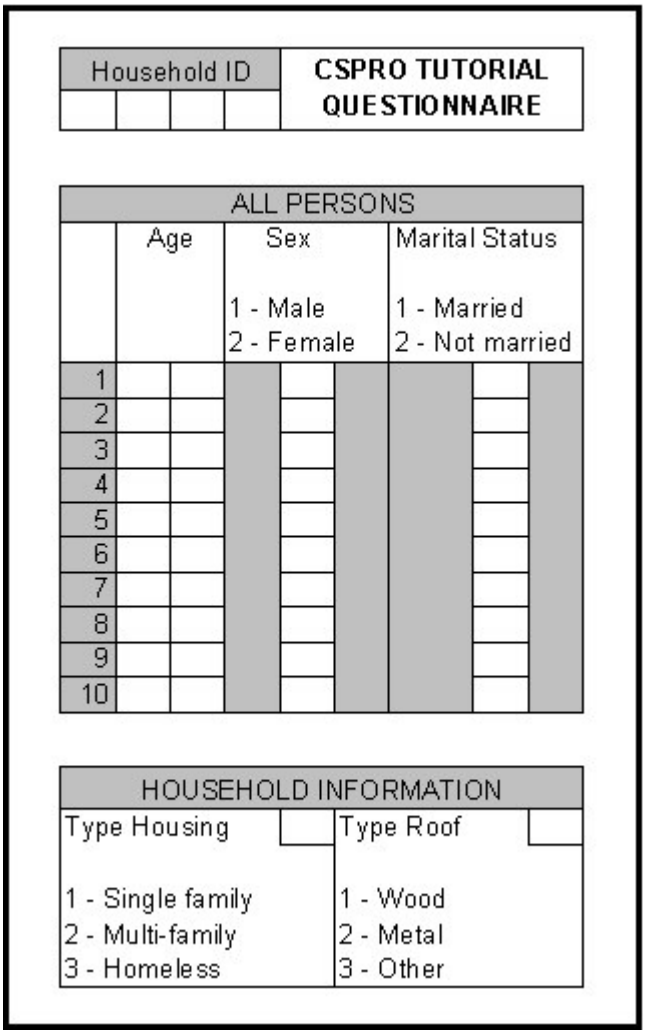
1. Create a Data Entry Application (3 steps)
2. Create the Data Dictionary (4 steps)
3. Create the Data Entry Forms (3 steps)
4. Enter Data (4 steps)
5. Tabulate Data (3 steps)
6. Modify the Table (3 steps)
7. Add Edits to the Data Entry Application (4 steps)
8. Run a Batch Application (4 steps)

Exercise 1: Create a Data Entry Application

Step 1: Examine the Tutorial Questionnaire

(Exercise 1, Create a Data Entry Application)

The tutorial exercises are based on a sample questionnaire. In Exercises 1 through 6 we will create a data entry application, key some data, then tabulate the data. In Exercises 7 and 8 we go back and add a consistency check.



Household ID	CSPRO TUTORIAL QUESTIONNAIRE

ALL PERSONS								
	Age		Sex 1 - Male 2 - Female			Marital Status 1 - Married 2 - Not married		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

HOUSEHOLD INFORMATION			
Type Housing		Type Roof	
1 - Single family 2 - Multi-family 3 - Homeless		1 - Wood 2 - Metal 3 - Other	

Note the following about the sample questionnaire:

- Each questionnaire corresponds to a household.
- Each questionnaire (household) has a unique four-digit number at the top.
- We collect age, sex, and marital status for up to ten people in the household.
- We collect type of housing and roof for the household.

Continue to the next step: Step 2: Start CSPro.

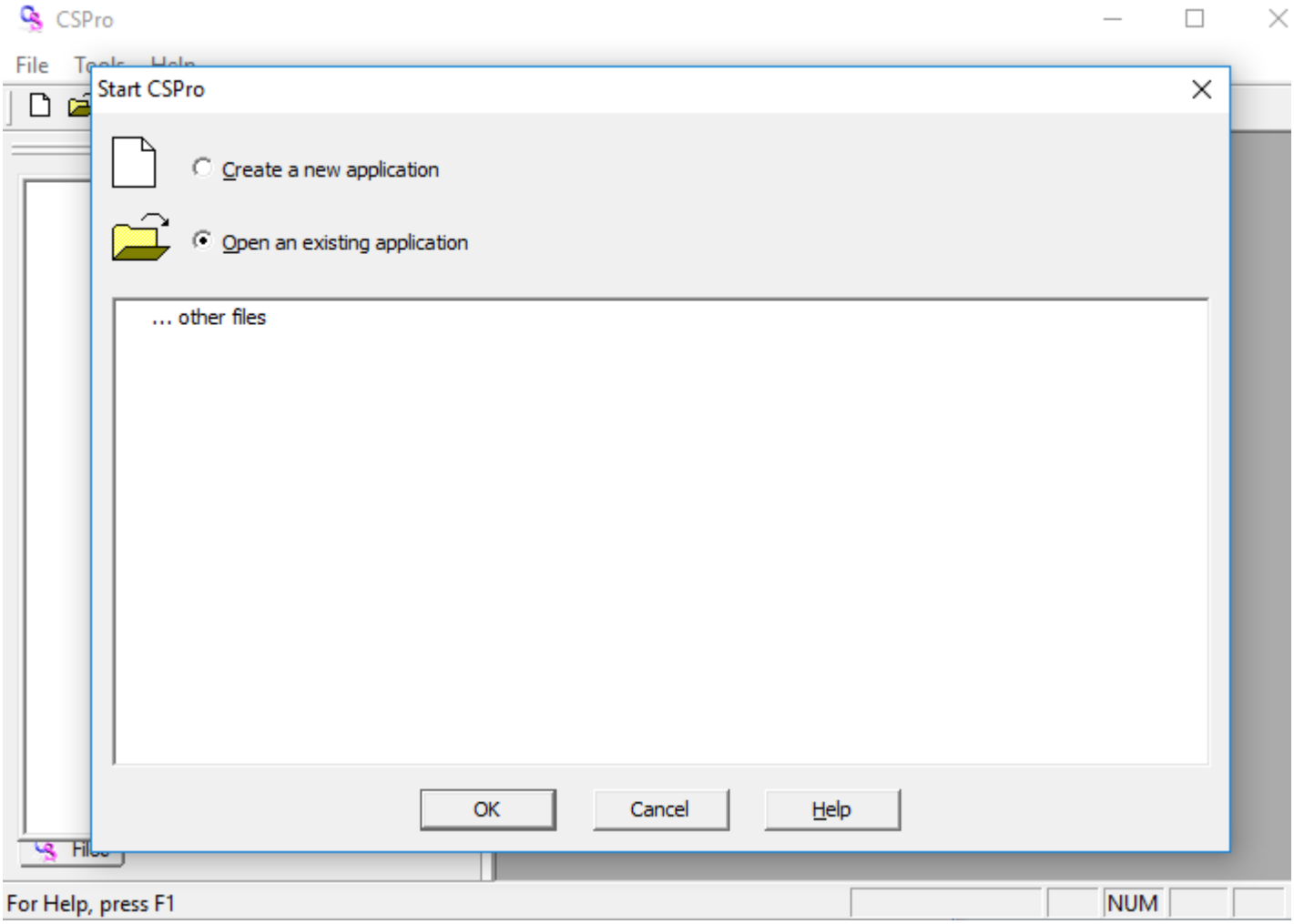
Step 2: Start CSPro

(Exercise 1, Create a Data Entry Application)

First, create a new folder for all files you will use in this tutorial. Open Windows Explorer and create a folder named **C:\CSProTutorial**.

Now you are ready to start CSPro, which you can by double-clicking on the CSPro 7.2 icon on your desktop, or by finding the proper link off the Start menu.

The CSPro main screen will appear:



Continue to the next step: Step 3: Naming Application Files.

Step 3: Naming Application Files

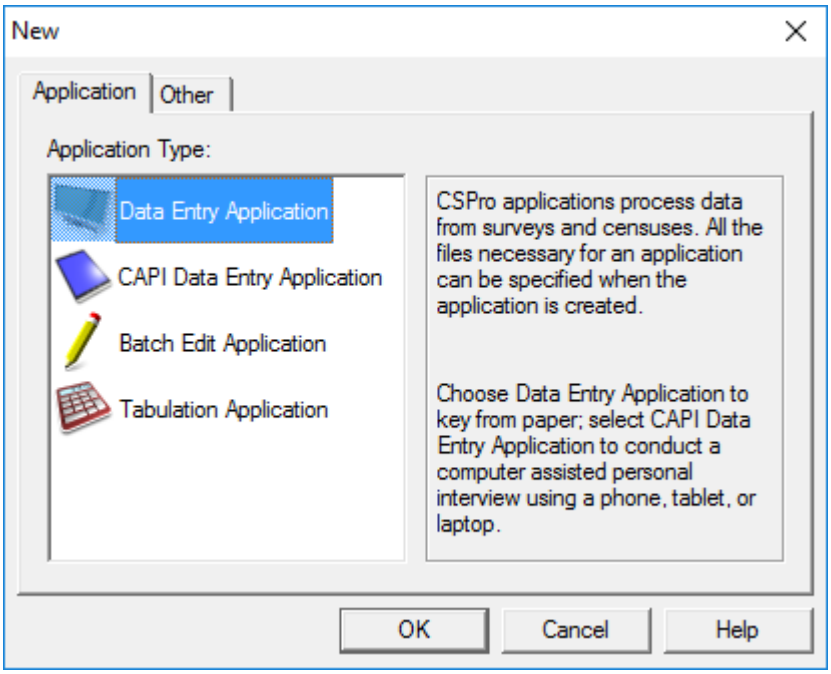
(Exercise 1, Create a Data Entry Application)

We will create a data entry application. This contains:

- Data dictionary: The data dictionary describes the organization of the data file. It holds information about all the questions and responses on the questionnaire.
- Forms: The forms will appear on the screen when you run the data entry application. They contain data entry fields, text, and rosters.

- Logic (optional): You can use the CSPro language to control the flow of your program, to write logic to check for errors during data entry, to access lookup files, and many other things. We will not use logic until Exercise 6.

We will use the Wizard to create the files that the data entry application requires. Click on the radio button that says **Create a new application**. You should see the following dialog box:



1. Select **Data Entry Application** and press **OK**.
2. In the file open dialog box, enter **MyEntry** as the file name for the application.
3. Make sure you are located in the folder you created for these exercises (**C:\CSProTutorial**).
4. Press **Save**.
5. The next screen will ask you to select the Input Dictionary.
6. Change the name to **C:\CSProTutorial\MyDict.dcf**.
7. Press **OK**.
8. CSPro will ask if you want to create a new dictionary. Press **Yes**.

You have created a new data entry application

This completes this exercise. Continue to the next exercise: Step 1: The ID Item.

Exercise 2: Create the Data Dictionary

Step 1: The ID Item

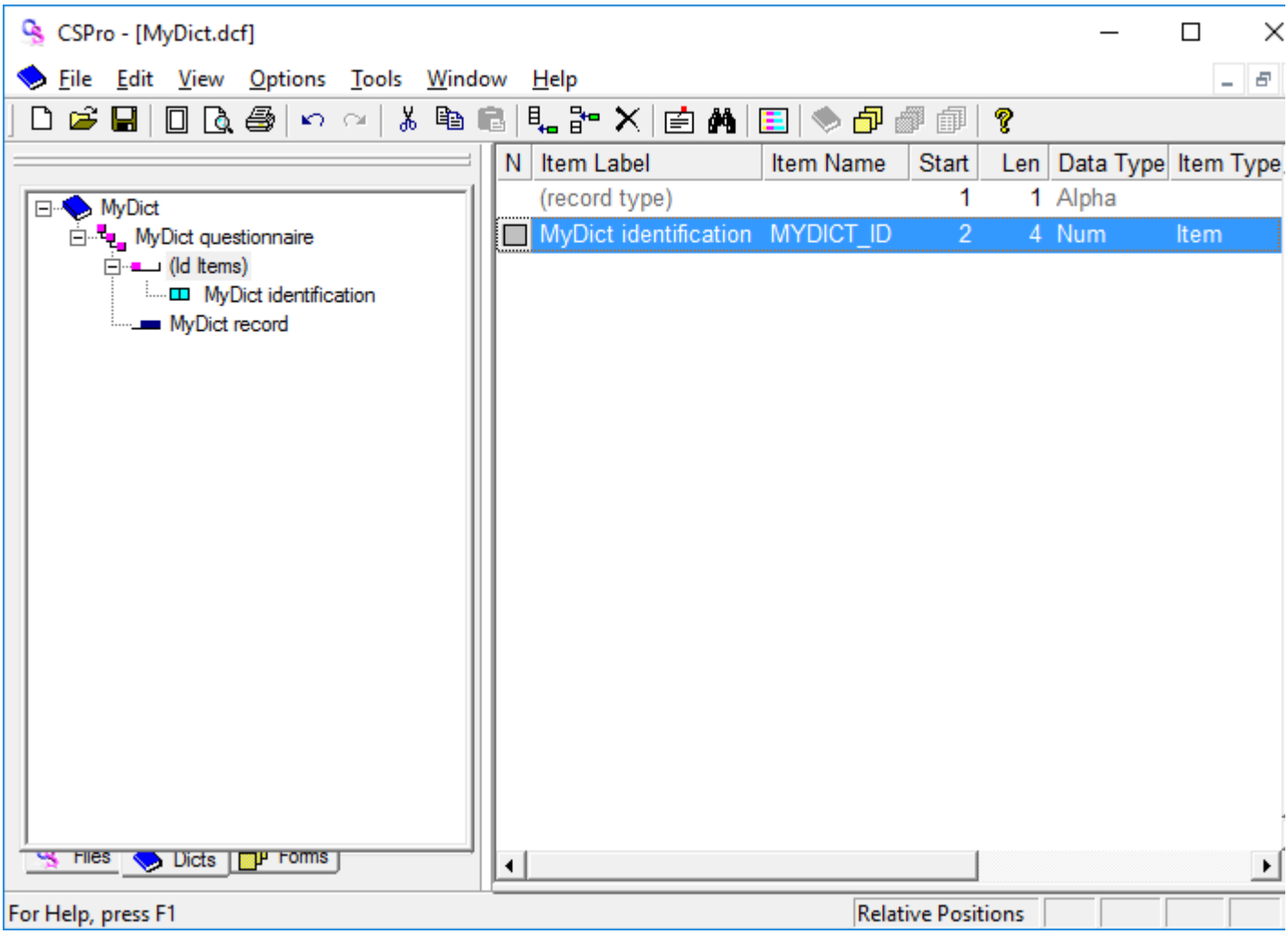
(Exercise 2, Create the Data Dictionary)

We will make our dictionary first, then our forms. CSPro automatically generates a skeleton data dictionary. We will change it and add our own information.

Every data dictionary requires at least one ID item, and you will often have more than one. An ID (identification) item is a unique number (or series of numbers) that allows CSPro to distinguish between individual questionnaires. CSPro requires at least one ID item.

1. Click on **(Id Items)**, then on the '**+**' next to it to open the tree on the left side of the screen. You will see that CSPro has created one ID item. On the right side of the screen you will see in the Len column that this item has the length of one character. We will make this four characters.
2. Right-click on **MyDict identification**, below **(Id Items)** on the tree, and then select **Modify Item**.
3. Press the **Enter** key three times until the length is highlighted in blue.
4. Type **4** and then **Enter**, then click on the white space below this line to finish making this change.

When you have completed this step the screen should look something like:



Continue to the next step: Step 2: The Records.

Step 2: The Records

(Exercise 2, Create the Data Dictionary)

A record usually corresponds to a section of a questionnaire and consists of a group of related questions.

By default, CSPro creates one record. Our tutorial application will have two records, a **Person Record** and a **Housing Record**. We will change the one record that CSPro generated to **Person Record**, and then add the **Housing Record**.

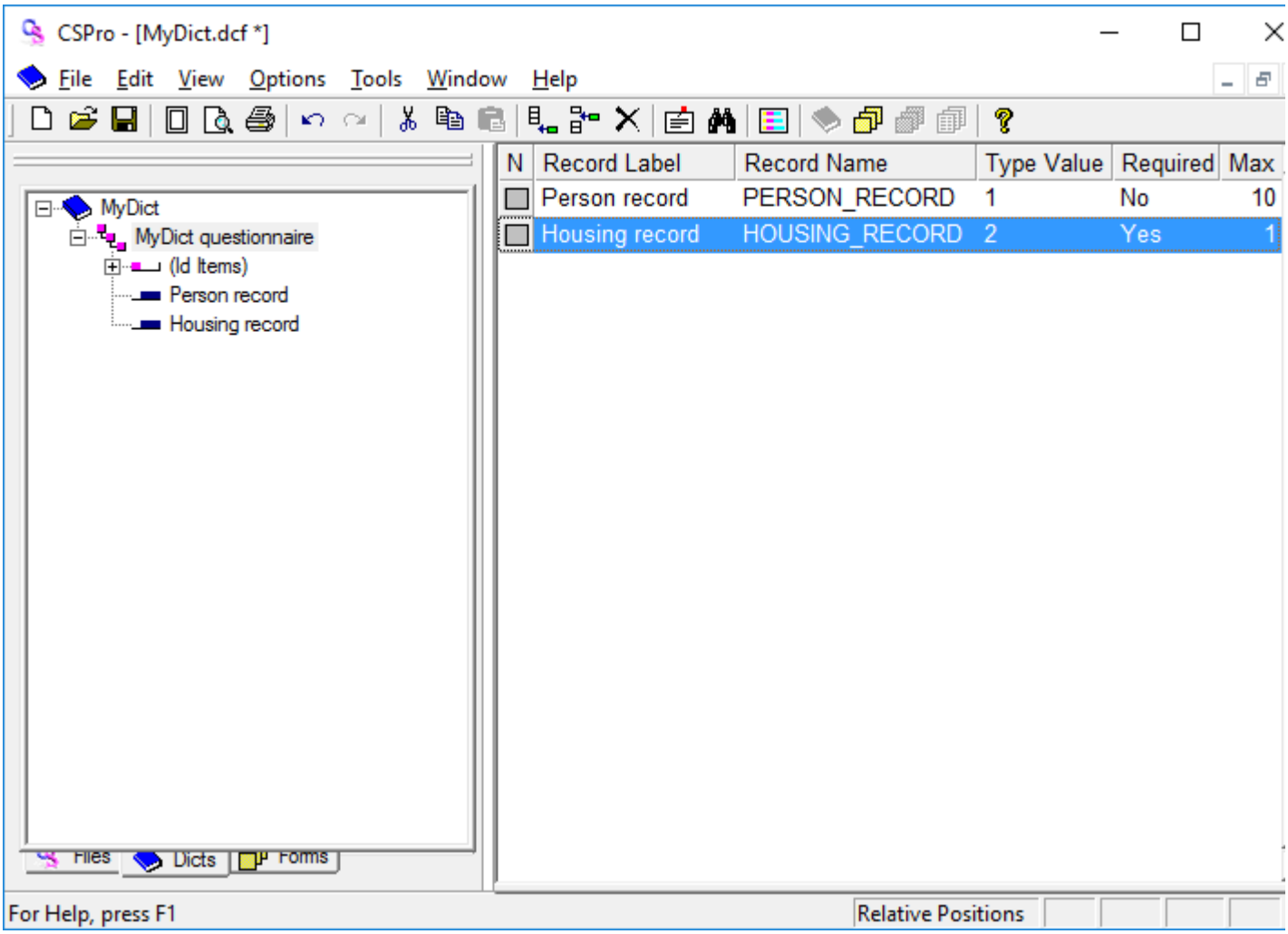
First, we will change the one record that CSPro generated to **Person Record**:

1. Right-click on **MyDict record** on the tree on the left, then select **Modify Record**.
2. Type **Person record** as the **Record Label**, then press **Enter**.
3. Type **PERSON_RECORD** as the **Record Name**, then press **Enter**.
4. Press **Enter** to leave the **Type Value** as is.
5. Press **N** to change **Required** from **Yes** to **No**, then press **Enter**. Our application can have households with no people, so person records are not required for us.
6. Our application can have up to 10 people in a household, so type **10**, then **Enter**, to change **Max** and complete the changes to this record.

Next we will add the **Housing Record**:

1. Right-click on **Person record** on the tree on the left, then select **Add Record**.
2. Type **Housing record** as the **Record Label**, the press **Enter**.
3. Press **Enter** to accept **HOUSING_RECORD** as the **Record Name**.
4. Press **Enter** to leave the **Type Value** as is.
5. Press **Enter** to leave **Required** as **Yes**.
6. Press **Enter** to leave **Max** as 1 and start a new record.
7. Press **Esc** on the blank record to finish making these changes.

When you have completed this step the screen should look something like:



Continue to the next step: Step 3: Creating the Items.

Step 3: Creating the Items

(Exercise 2, Create the Data Dictionary)

First, we will create the items **Age**, **Sex**, and **Marital status** in the **Person record**.

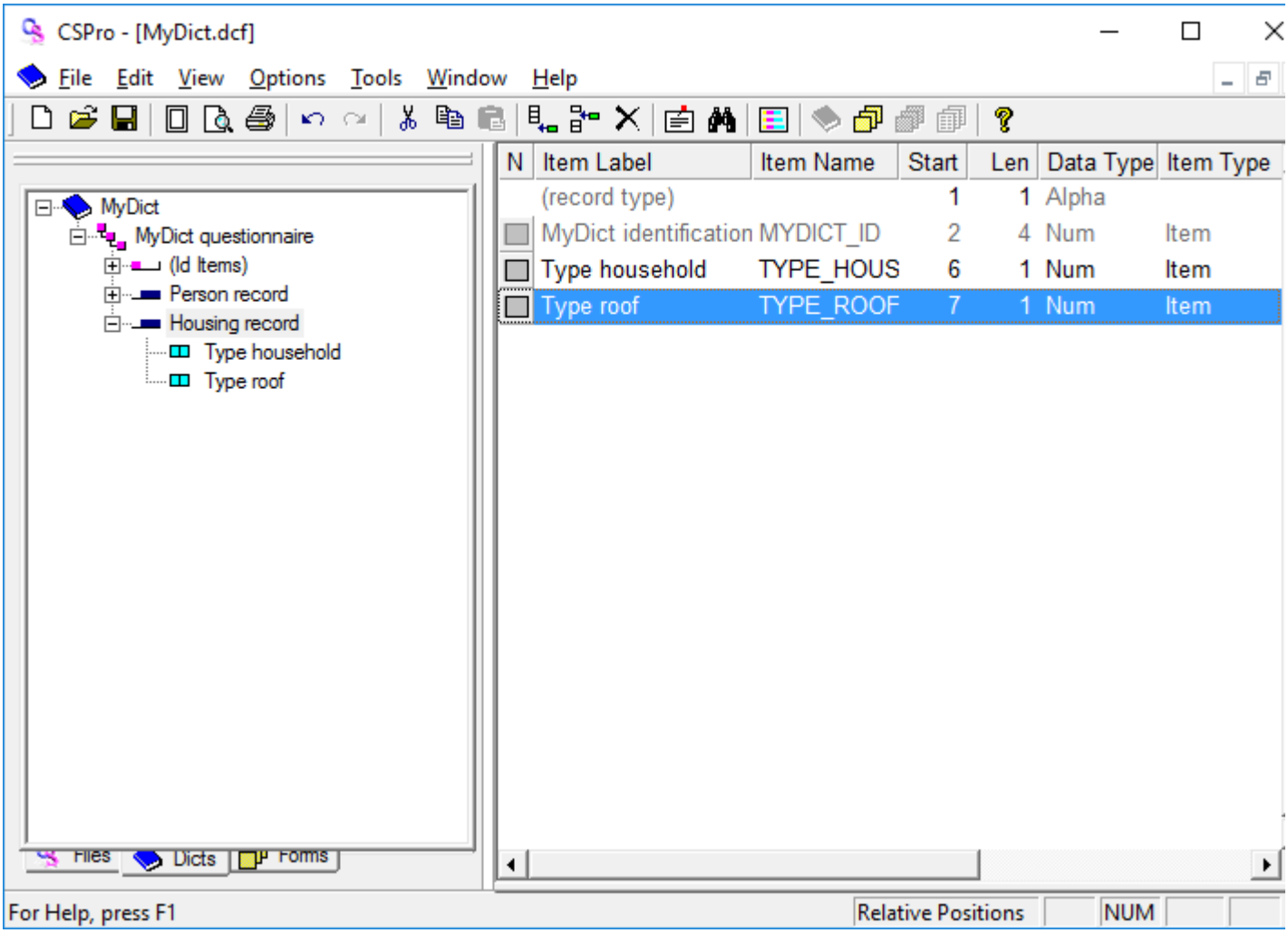
1. Right-click on **Person record** on the tree, then select **Add Item**.
2. Enter **Age** as the **Item Label**, then press **Enter**.
3. Press **Enter** to accept **AGE** as the **Item Name**.
4. Press **Enter** to accept the **Start** position.

5. Type **2** then **Enter** to indicate that **Age** takes up two characters. This is because in our application we have chosen to enter ages only up to 99.
6. Press **Enter** six times to accept the rest of the default attributes for **Age**.
7. Enter the attributes for the **Sex** item. After you type in the label and name, you can keep pressing **Enter** to accept all the other default attributes.
8. Enter the attributes for the **Marital status** item. After you type in the label and name, you can keep pressing **Enter** to accept all the other default attributes.
9. Press **Esc** to finish creating the items.

Next, we will create the **Type household** and **Type roof** items in the **Housing record**.

1. Right-click on **Housing record**, then select **Add Item**.
2. Enter the attributes for the **Type household** item. After you type in the label and name, you can keep pressing **Enter** to accept all the other default attributes.
3. Enter the attributes for the **Type roof** item. After you type in the label and name, you can keep pressing **Enter** to accept all the other default attributes.
4. Press **Esc** to finish creating the items.

When you have completed this step the screen should look something like:



Continue to the next step: [Step 4: Creating Values for the Items](#).

Step 4: Creating Values for the Items

(Exercise 2, Create the Data Dictionary)

Value sets define what data values we expect for a data item. Value sets are used to define ranges of valid values during data entry and to define categories for cross tabulation.

First we will create a value set for **Age**. We will use ten-year age groups.

1. Click on the **+** next to **Person record** to make sure its items are showing on the tree.
2. Right-click on **Age** and then select **Add Value Set**.
3. Press **Enter** twice to accept the default **Value Set Label** and **Value Set Name**. The cursor will drop to the line below into the **Value Label** column.
4. Type **0 to 9** for the **Value Label**, then **Enter**.
5. Type **0** as the **From** value, then **Enter**.
6. Type **9** as the **To** value, then **Enter** twice, skipping over the **Special** column.
7. Type **10 to 19** for the next **Value Label**, then **Enter**.
8. Type **10** as the **From** value, then **Enter**.
9. Type **19** as the **To** value, then **Enter** twice, skipping over the **Special** column.
10. Continue in this fashion until you have reached **90 to 99**.

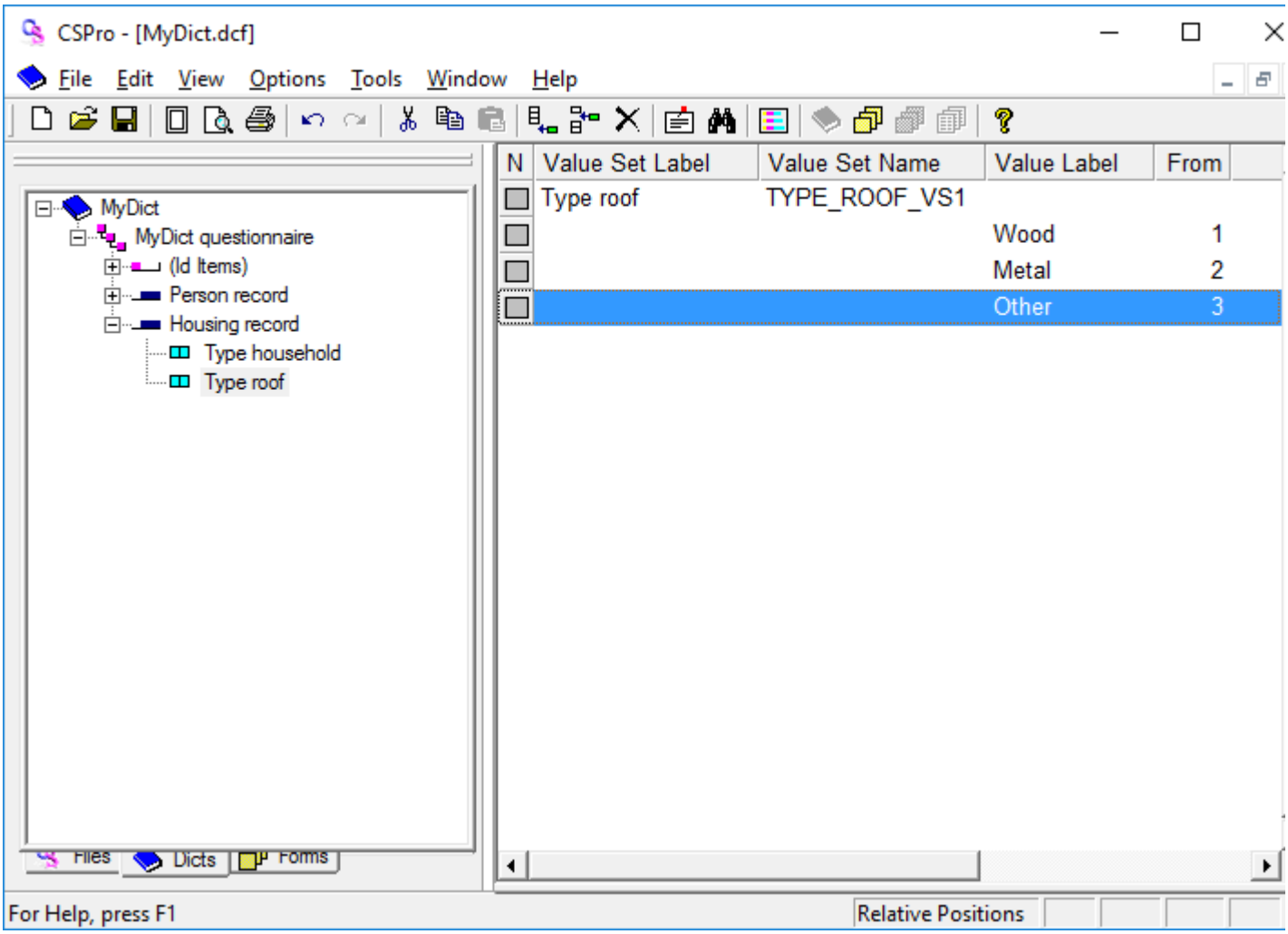
Next, we will create a value set for **Sex**.

1. Right-click on **Sex**, then select **Add Value Set**.
2. Press **Enter** twice to accept the default **Value Set Label** and **Value Set Name**. The cursor will drop to the line below into the **Value Label** column.
3. Type **Male** as the first **Value Label**.
4. Type **1** as the **From** value.
5. Press **Enter** twice to skip over the **To** and **Special** columns.
6. Type **Female** as the second **Value Label**.
7. Type **2** as the **From** value.
8. Press **Enter** twice to skip over the **To** and **Special** columns.
9. Press **Esc** to finish creating the value set.

To finish up:

1. Add a value set for **Marital status**. Use **1** for **Married** and **2** for **Not married**.
2. Add values for the **Housing record** items from the housing information in the questionnaire.
3. Save the work you have done so far: Select **File** -> **Save** from the main menu, or click on  on the toolbar.

When you completed this step, the screen might look something like:



This completes this exercise. Continue to the next exercise: [Step 1: Place ID and Housing Items on Form]

Exercise 3: Create the Data Entry Forms

Step 1: Place ID and Housing Items on Form

(Exercise 3, Create the Data Entry Forms)

We will now switch from the data dictionary to the forms.

Generally it is a good idea to make the data entry forms look just like the questionnaire itself. We can easily do this in CSPro. However, in order to show you more features and save time, we will not do so in this tutorial.

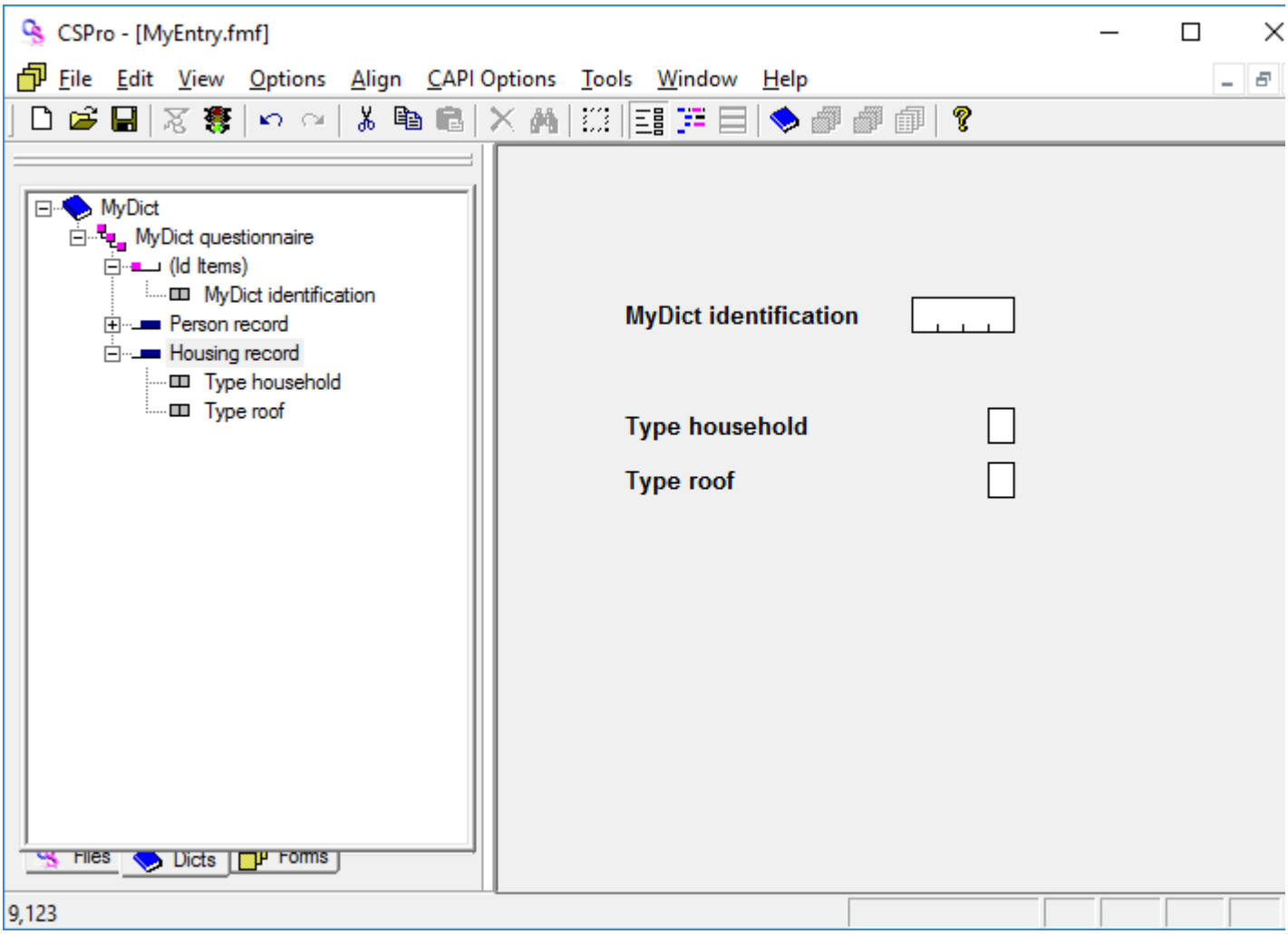
We will place the dictionary items on the data entry form.

1. Click  on the toolbar. A blank gray form will appear on the right hand side of the screen.
2. Make sure the items on the tree are expanded so you can see them all. If any item has a **+** sign next to it, click on the **+** sign.
3. Drag and drop **MyDict identification** from the tree to the top of the form. (Click on **MyDict identification** and hold the mouse button down while you move the mouse to the top of the form, then release the mouse button.)
4. Drag and drop **Housing record** from the tree to the form, underneath **MyDict identification**. Click **OK** to accept the **Drag Options** settings.

Next, we will line things up.

1. Multi-select the three pieces of text. Hold down the **Ctrl** key and click on **MyDict identification**, then click on **Type household**, click on **Type roof**, then release the **Ctrl** key.
2. Select **Align** -> **Left** from the main menu.
3. Multi-select the three data entry boxes.
4. Select **Align** -> **Right**.

When you have completed this step the screen should look something like:



Continue to the next step: Step 2: Add Text and Boxes.

Step 2: Add Text and Boxes

(Exercise 3, Create the Data Entry Forms)

First, we will add our own line of text at the top of the screen.

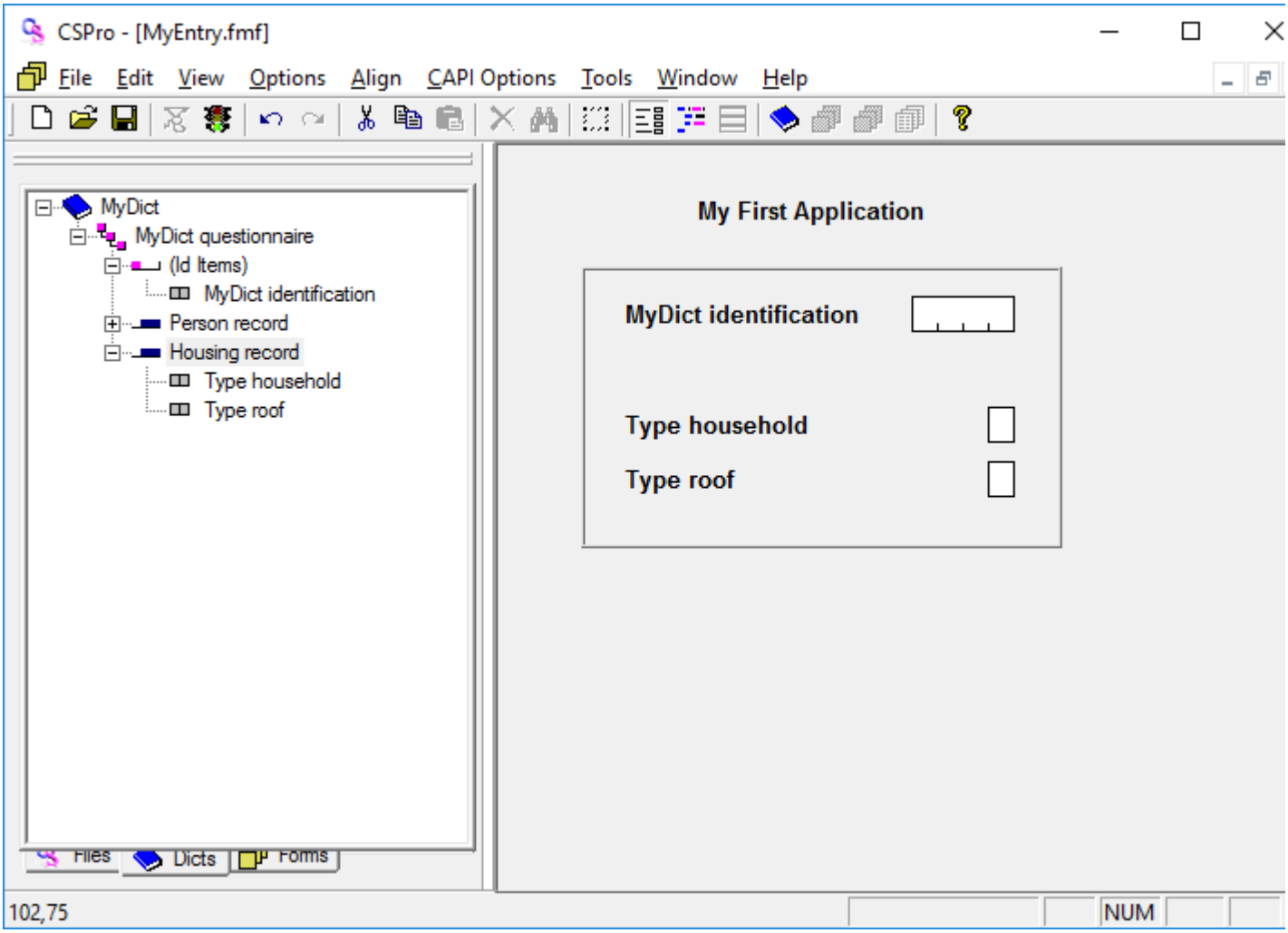
1. Right-click on the form, somewhere above **MyDict identification**.
2. Select **Add Text** from the menu.
3. Type **My First Application** and then **Enter** (or click on **OK**).
4. Adjust the position of the text until it is just where you want it. To do this, select the text (click on it) and use the arrow keys, or drag and drop the text to the new location.

Next we will draw a box around the data entry fields.

1. Click on the toolbar. A small toolbar will appear floating over the screen.
2. Click on the box second to the right of the floating toolbar.
3. Position the mouse pointer above and to the left of **MyDict identification**.
4. Left-click and hold the button down.
5. Drag the mouse toward the right and down.
6. When the box looks the way you want it, release the mouse button.

7. Click  again on the toolbar to close the floating toolbar.

When you have completed this step the screen should look something like:



Continue to the next step: Step 3: Generate Forms Automatically.

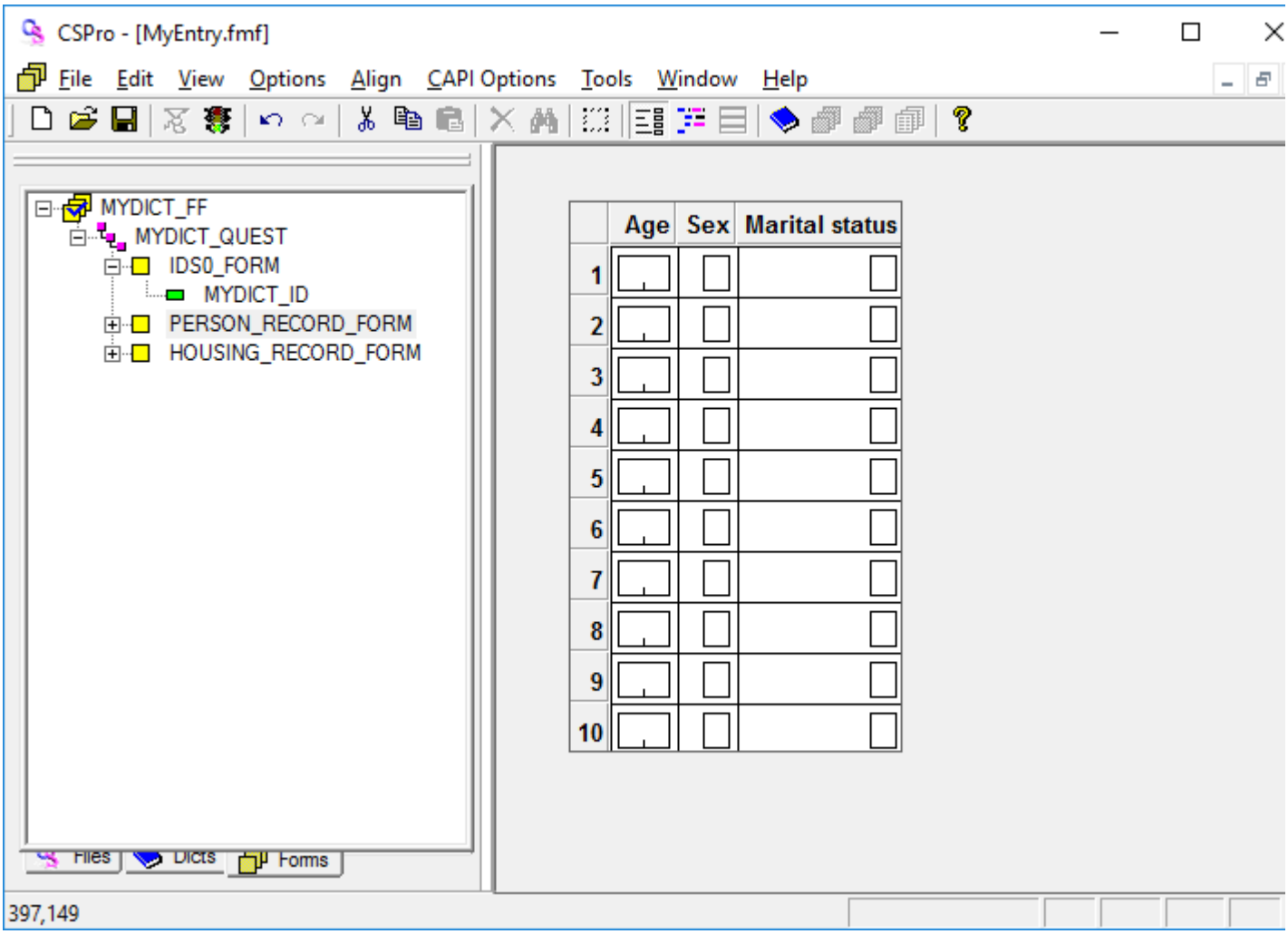
Step 3: Generate Forms Automatically

(Exercise 3, Create the Data Entry Forms)

CSPro allows you to generate a complete set of forms, which include all the items in the data dictionary, in one operation. We will use this feature now in order to save time.

1. Select **Edit** -> **Generate Forms** from the main menu, or press **Ctrl+G**.
2. CSPro will warn you that the forms you made in steps 1 and 2 will be replaced. Click on **Yes** to continue.
3. The **Drag Options** dialog box will appear. Make sure the **Roster Options** has **Horizontal** selected. Click on **OK** to close the **Drag Options** dialog box.
4. Note that the tree on the left shows that you now have three forms. Open up the entire tree by clicking the **+** next to any part of the tree.
5. Click on **PERSON_RECORD_FORM** on the tree. You will see the roster that CSPro created for you.
6. Click around on the tree on the left as you like to explore the forms that CSPro created.
7. Save the work you have done so far. Select **File** -> **Save** from the main menu, or click  on the toolbar.

When you have completed this step the screen should look something like:



This completes this exercise. Continue to the next exercise: Step 1: Run the Data Entry Application.

Exercise 4: Enter Data

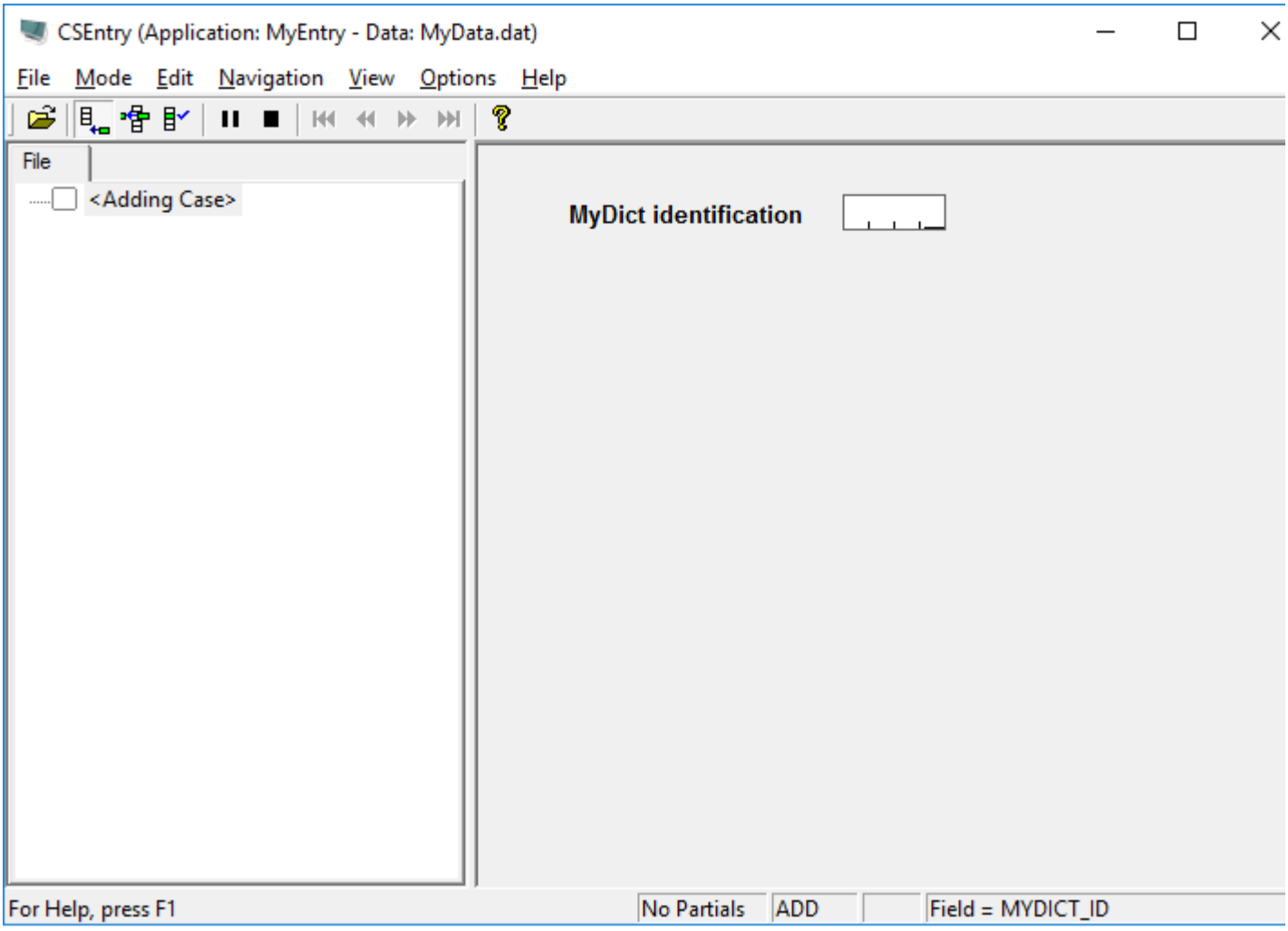
Step 1: Run the Data Entry Application

(Exercise 4, Enter Data)

Your data entry application is now ready to run! CSEntry is the name of the program that runs this application, allowing you to key in data.

1. Run CSEntry by clicking on the toolbar, or pressing **Ctrl+R**. CSPro will ask you to save your work if you haven't already done so. Click **Yes**.
2. CSEntry will ask you to select a data file. The data we key will go into this file. Change to the folder you created for this set of exercises, **C:\CSProTutorial**. Type **MyData.dat** for the file name, then press **Enter**.
3. CSEntry will ask if you want to create a new file. Click **Yes**.
4. CSEntry will ask for your **Operator ID**. You may type in anything you like.
5. The first data entry form will appear with the cursor ready for you to begin entering data.

When you have completed this step the screen should look something like:



Continue to the next step: Step 2: Add a Case.

Step 2: Add a Case

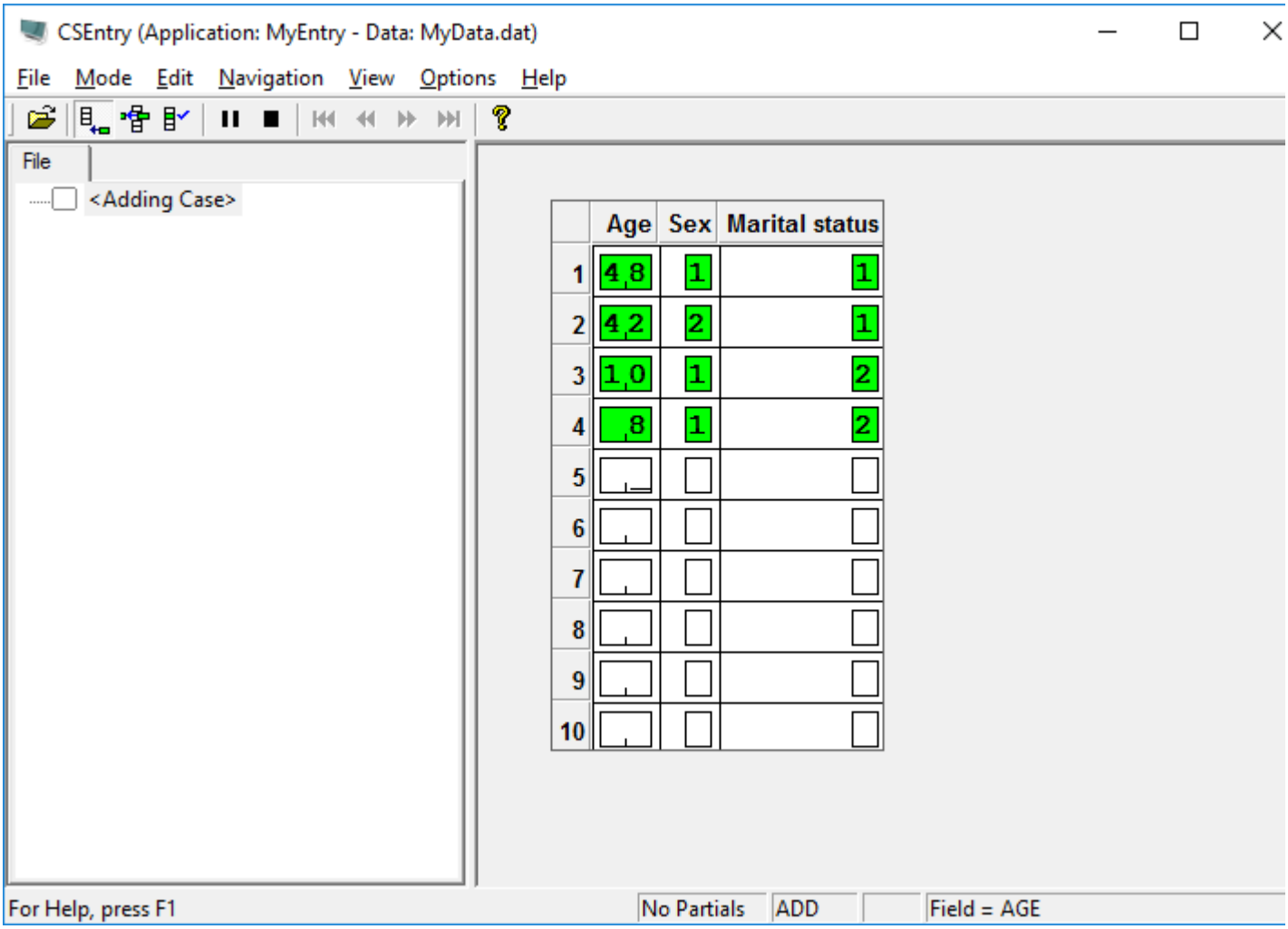
(Exercise 4, Enter Data)

We will now type in the data for our first case (questionnaire). We will use a fictitious family of four.

1. Type **1** then **Enter** to fill in the ID item. The next form will appear, showing the person roster.
2. Type **48** in the **Age** field. The cursor will move to the **Sex** field.
3. Type **3** in the **Sex** field. CSEntry will tell you this value is out of range, because it is not in the value set for **Sex** you created in your data dictionary.
4. With the **OUT OF RANGE** message still showing, type **1**. The message will go away and the cursor will move to the **Marital status** field.
5. Continue typing in data for the family as shown below.

Some CSEntry tips:

- You can move backward to the previous field using **Shift+Tab**, **left arrow** or **up arrow**.
- You can move forward to the next field using **Enter**, **Tab**, **right arrow** or **down arrow**.
- You can change a field by simply typing a new number into it.
- You can erase a field using the space bar.



Continue to the next step: Step 3: Finish Adding a Case.

Step 3: Finish Adding a Case

(Exercise 4, Enter Data)

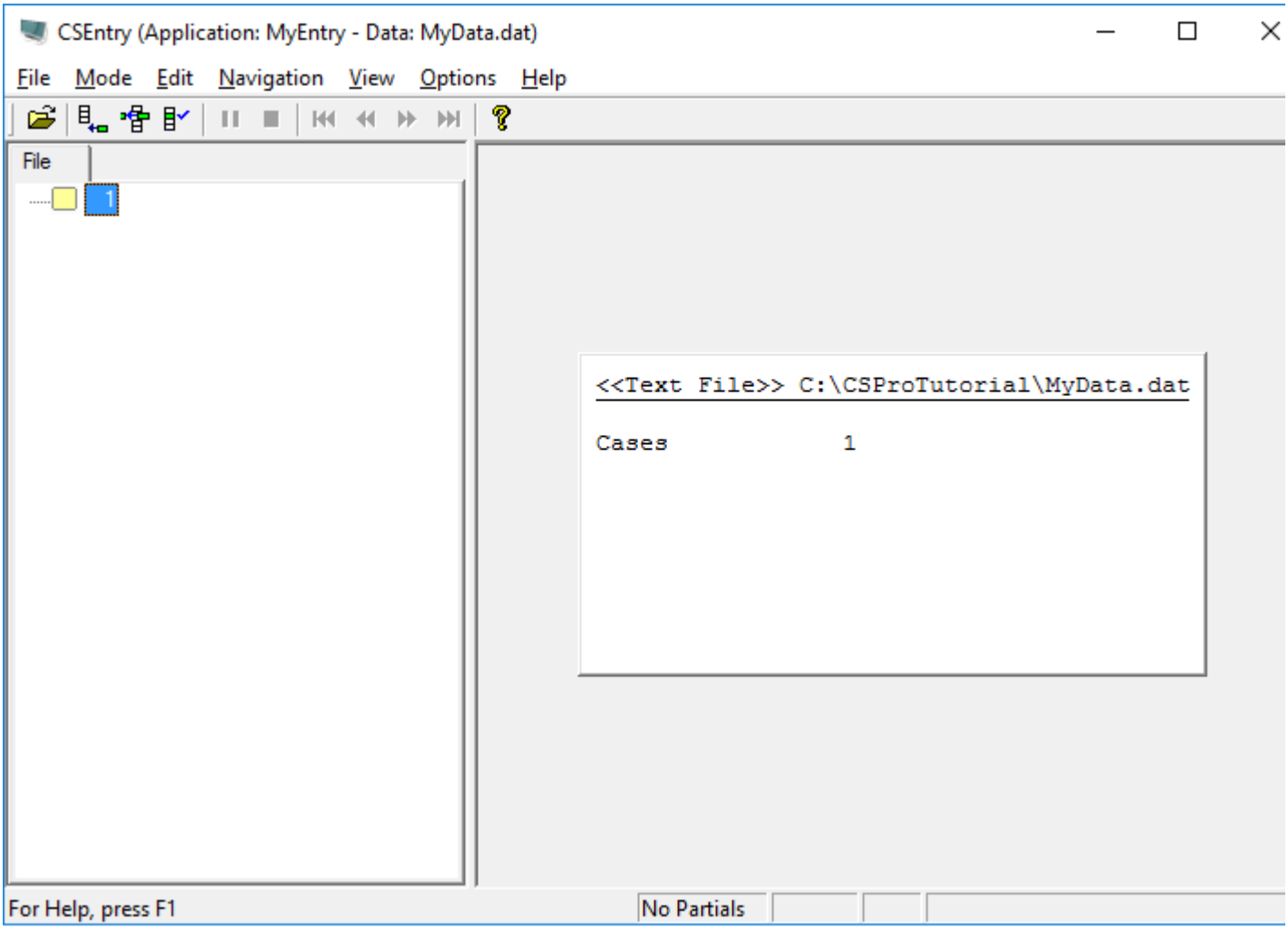
We will now tell the roster that we have finished entering people.

1. Hold down the **Ctrl** key.
2. Press the slash key **/** (on the numeric keypad). The next form will appear on the screen. If you have trouble finding this key combination, which could be the case on some laptops, you can select **Navigation** -> **End Group** from the main menu.

Next we will type in the household form and end the case.

1. Type **1** in the **Type household** field.
2. Type **1** in the **Type roof** field.
3. CSEntry will ask us to accept the case. At this point you can select **No** and go back and make changes to the data in the case if you like. If you are satisfied that the data are correct, press **Enter** or select **Yes**.
4. CSEntry will now show the first form again, with the cursor ready for you to type in another case. We will now stop adding cases. Click ■ on the toolbar, or press **Esc** or **Ctrl+S**, or select **Mode** -> **Stop** from the main menu.

When you have completed this step the screen should look something like:



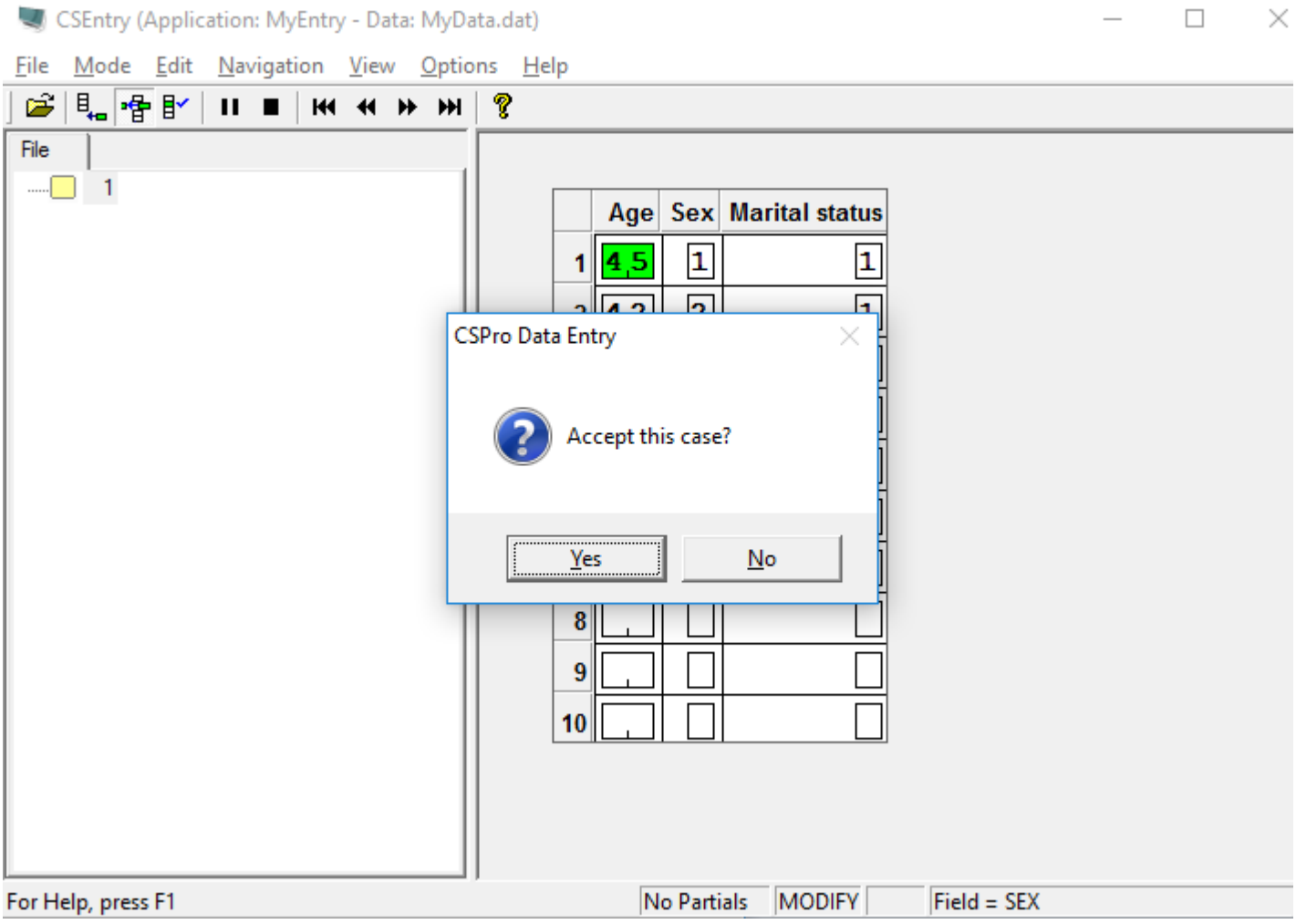
Continue to the next step: Step 4: Modify a Case.

Step 4: Modify a Case

(Exercise 4, Enter Data)

Now we realize that the first person in the household is really 45-years-old and not 48 as we typed in. We will go back into the data and change this value.

1. Click on  on the toolbar, or press **Ctrl+M** to enter **Modify** mode. You should see the first form, with the value **1** showing for **MyDict identification**.
2. Press the **PgDn** key to advance to the next form.
3. Type **45** in the **Age** field.
4. Press **F12** to indicate that you have finished making your changes.
5. The screen will now look something like the picture below. CSEntry will ask you to accept the case, like it did in the previous step. Select **Yes**.
6. CSEntry will save your changes and exit from **Modify** mode.
7. Close CSEntry by clicking on the **X** in the top right corner, or selecting **File** -> **Exit** from the main menu.



This completes this exercise. Continue to the next exercise: Step 1: Create a Tabulation Application.

Exercise 5: Tabulate Data

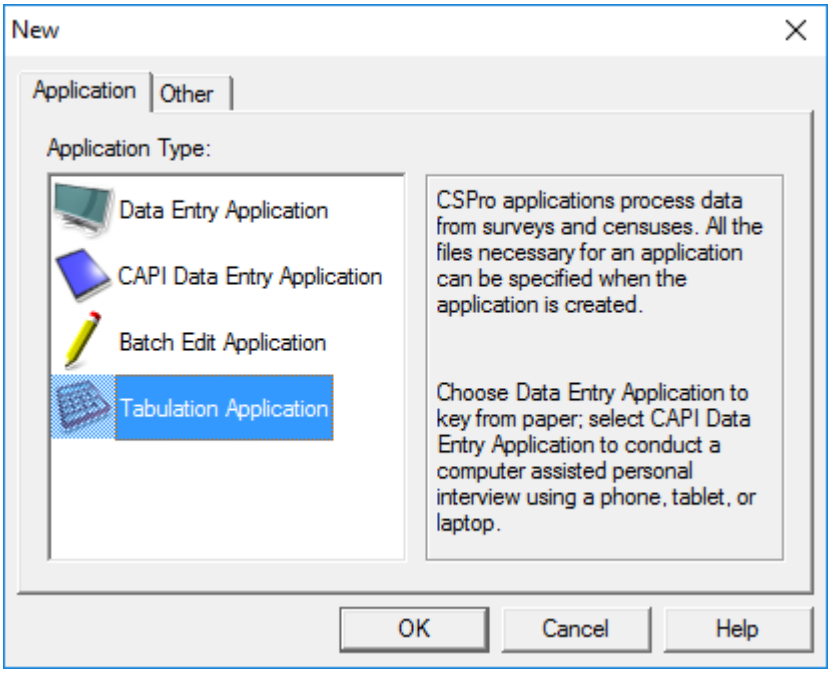
Step 1: Create a Tabulation Application

(Exercise 5, Tabulate Data)

In this exercise we will perform simple cross tabulations of the data you entered in the previous exercise.

If you still have your data entry application open from previous exercises, close it now. Select **File** -> **Close** from the main menu. CSPro may prompt you to save changes. Select **Yes**.

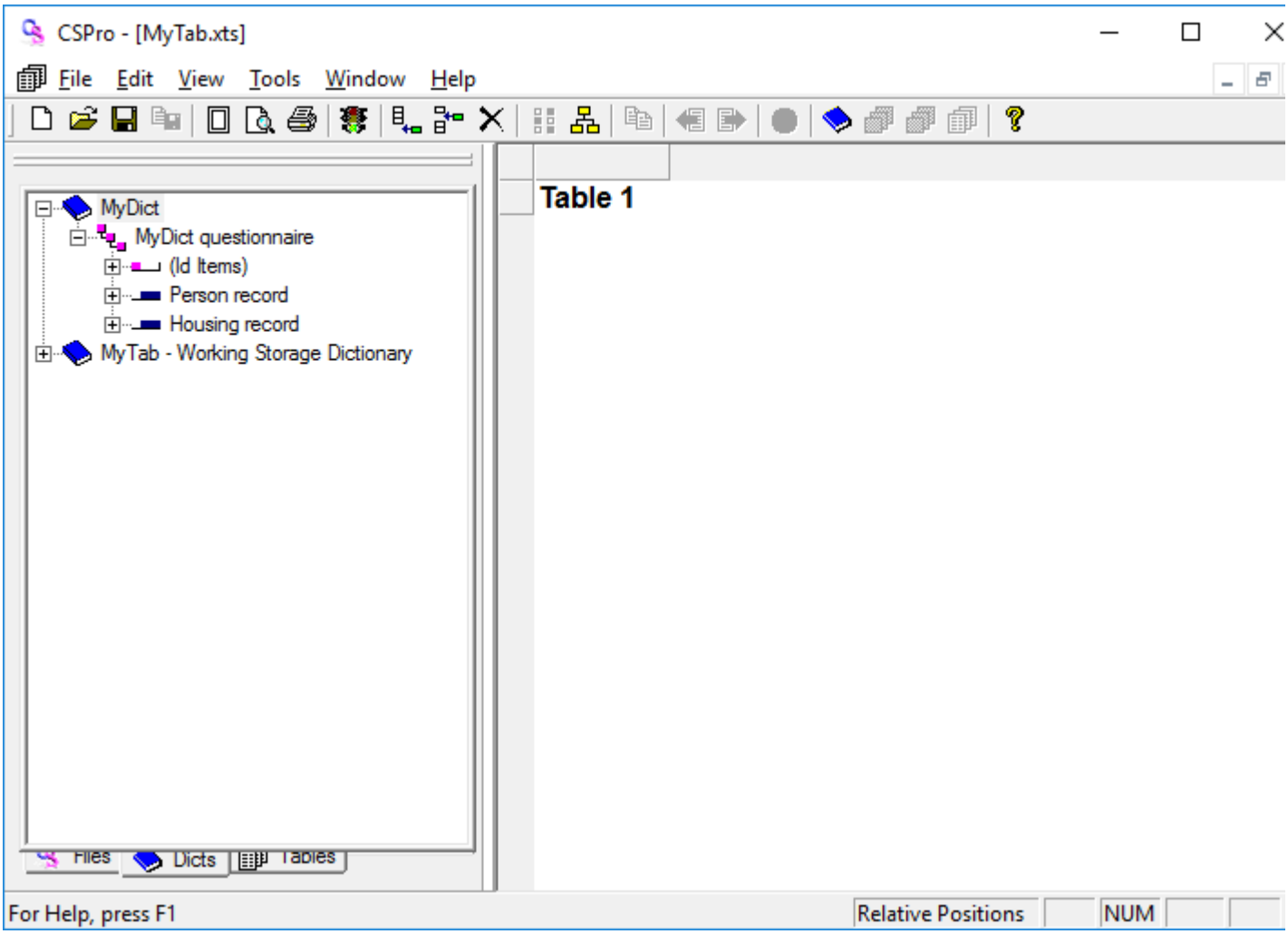
We will now create a cross tabulation application using the Wizard, as we did previously.



1. Select **File** -> **New** from the main menu, or click on the toolbar.
2. Select **Tabulation Application** and press **OK**.
3. In the file open dialog box, enter **MyTab** as the file name for the application.
4. Make sure you are located in the folder you created for these exercises (**C:\CSProTutorial**).
5. Press **Save**.
6. The next screen will ask you to select the Input Dictionary.
7. Change the name to **C:\CSProTutorial\MyDict.dcf**.
8. Press **OK**.

You are now ready to begin designing your tabulation.

When you have completed this step the screen should look something like:



Continue to the next step: Step 2: Select Items to Tabulate.

Step 2: Select Items to Tabulate

(Exercise 5, Tabulate Data)

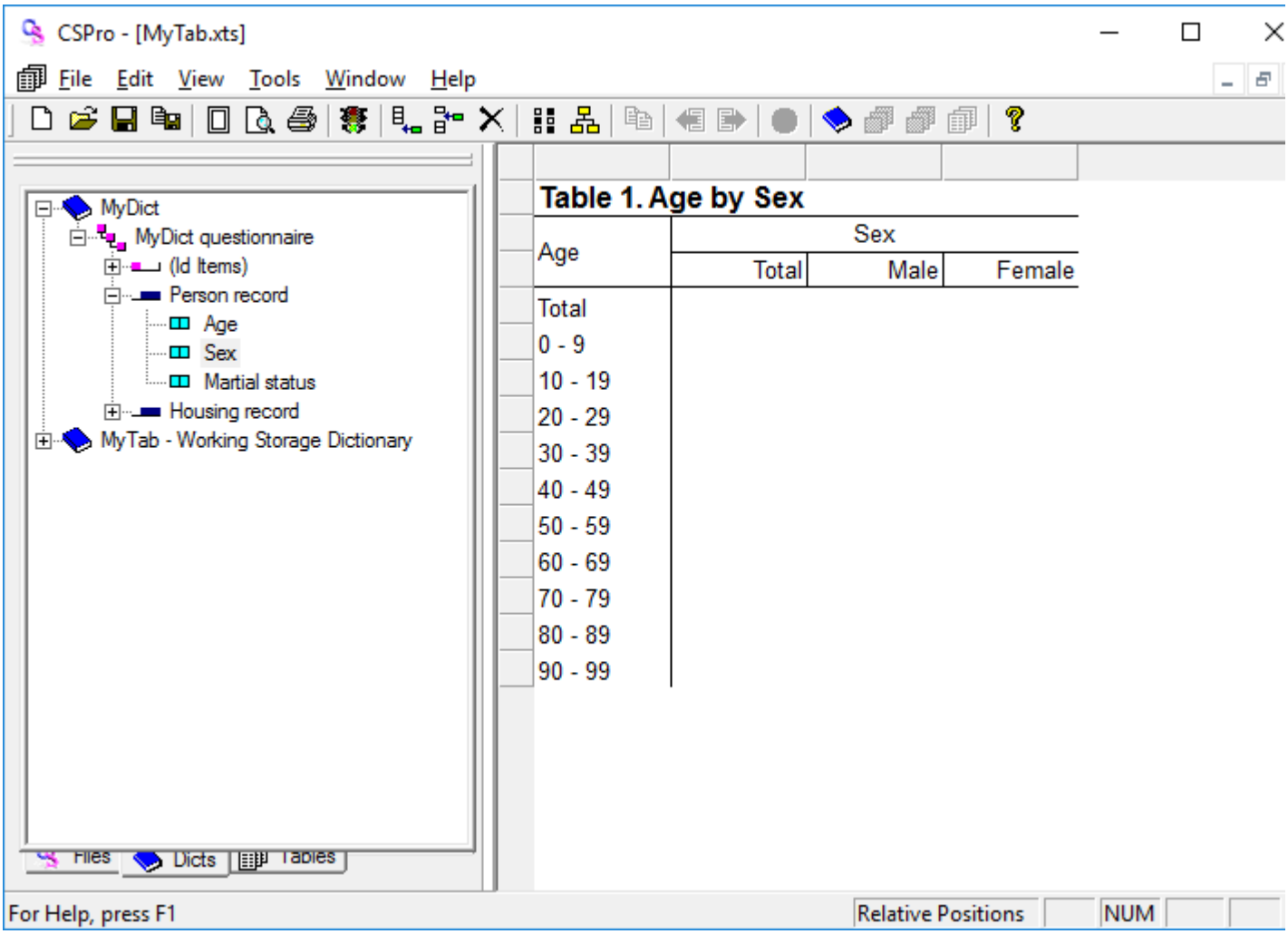
We will create a tabulation of **Age** by **Sex**. **Age** will appear as the rows and **Sex** as the columns.

1. Click on the **+** next to **Person record** to make sure its items are showing on the tree.
2. Drag and drop **Age** from the tree to the left side of the table. (Click on **Age** and hold the mouse button down while you move the mouse to the side of the table then release the mouse button.) The drop point should be in the white space next to one of the gray boxes along the side.
3. Drag and drop **Sex** from the tree to the top of the table. (Click on **Sex** and hold the mouse button down while you move the mouse to the top of the table then release the mouse button.) The drop point should be in the white space just under one of the gray boxes along the top.

Tips for creating tabulations:

- The item you drag from the dictionary tree will become either a row item or a column item depending on where you drop it. Imagine a diagonal line from the top left to the bottom right of the table. An item dropped on the left/under that line becomes a row item. An item dropped on the right/above that line becomes a column item.
- You can remove an item from the table by clicking on any of its associated labels then dragging and dropping it back to the dictionary tree.

When you have completed this step the screen should look something like:



Continue to the next step: Step 3: Run the Tabulation.

Step 3: Run the Tabulation

(Exercise 5, Tabulate Data)

We are now ready to run the tabulation. We will use the data file you created in the previous exercise.

1. Run the tabulation by clicking on the toolbar, or pressing **Ctrl+R**. If CSPro prompts you to save the changes, click on **Yes**.
2. CSPro will ask you for the data file(s) to tabulate. Select **MyData.dat**. Make sure the dialog box is set to the folder you created for these exercises, **C:\CSProTutorial**.
3. The tabulated numbers will now appear in the table. That's all there is to it!

When you have completed this step the screen should look something like:

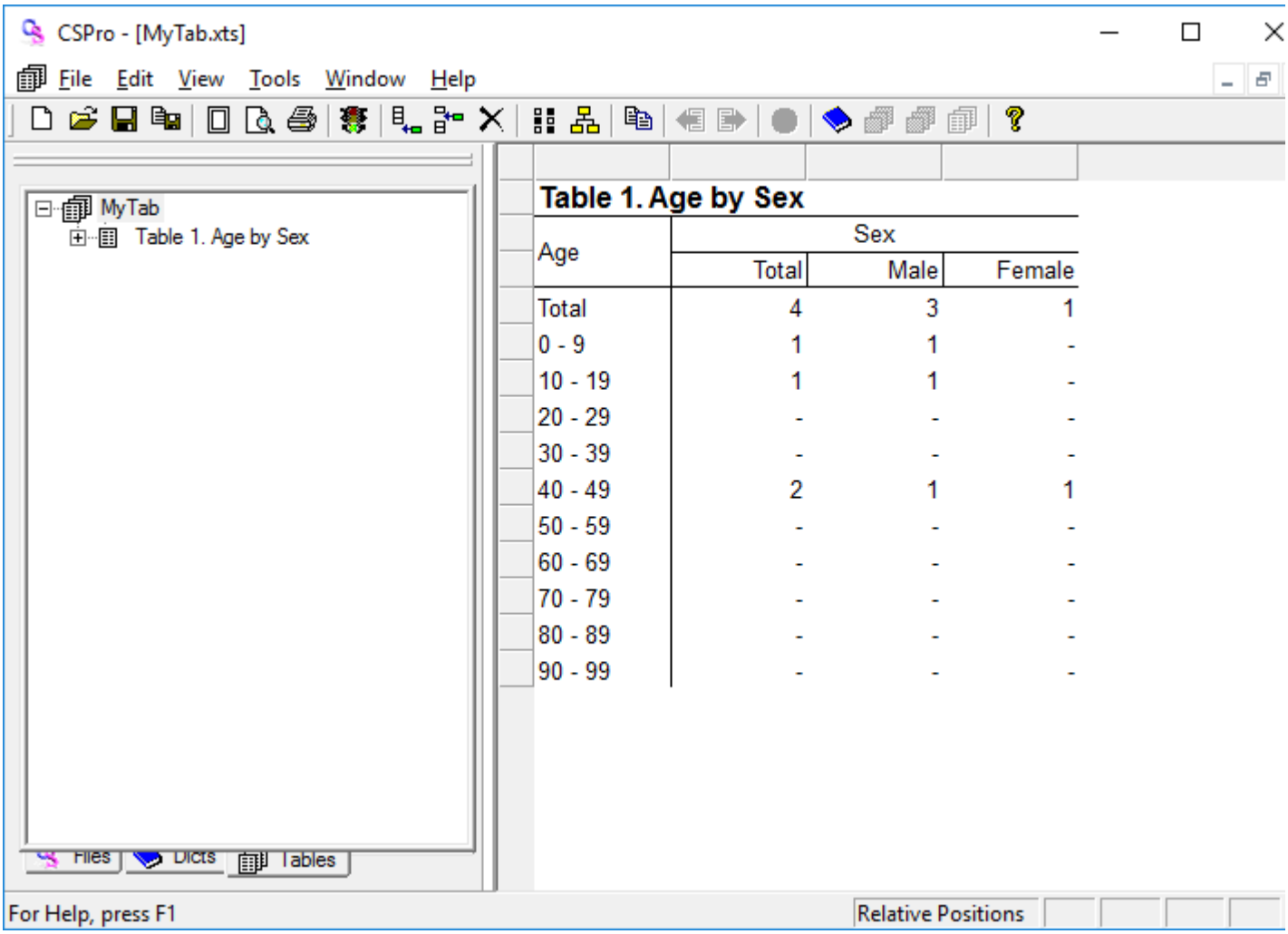


Table 1. Age by Sex

Age	Sex		
	Total	Male	Female
Total	4	3	1
0 - 9	1	1	-
10 - 19	1	1	-
20 - 29	-	-	-
30 - 39	-	-	-
40 - 49	2	1	1
50 - 59	-	-	-
60 - 69	-	-	-
70 - 79	-	-	-
80 - 89	-	-	-
90 - 99	-	-	-

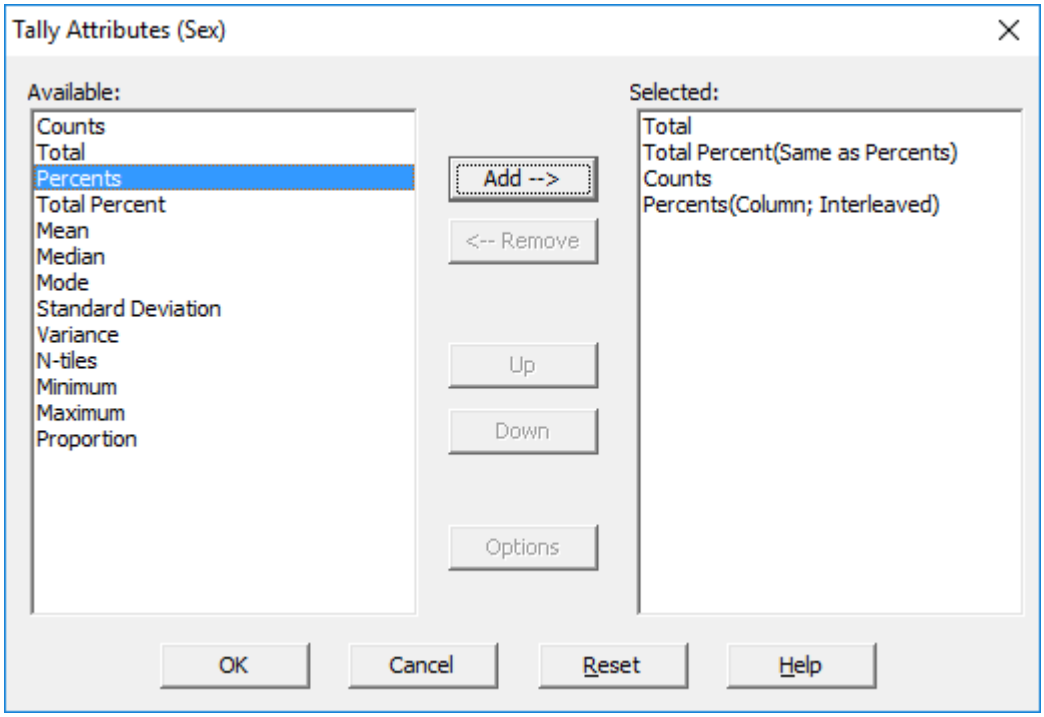
This completes this exercise. Continue to the next exercise: Step 1: Add Percents.

Exercise 6: Modify the Table

Step 1: Add Percents

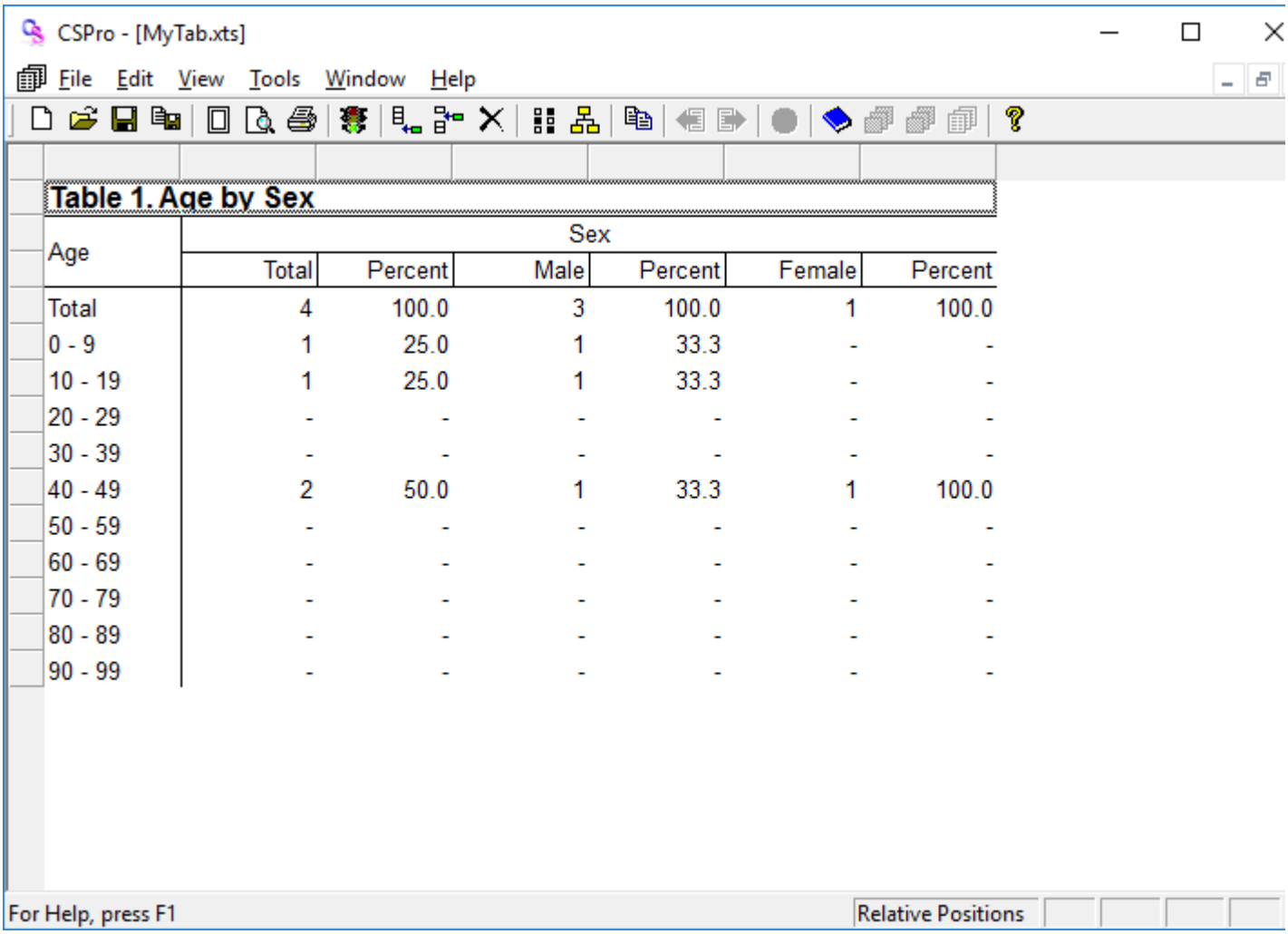
(Exercise 6, Modify the Table)

In this exercise we will modify the table you created in the previous exercise. We will begin by adding percents to the columns next to the values for the **Sex** variable.



1. Right-click on the word **Sex** on the table, just above the word **Male**.
2. Select **Tally Attributes (Sex)** from the right-click menu.
3. In the list on the left of the dialog box marked **Available**, click on **Percents** and then click the **Add -->** button. You should now see **Percents** listed in the list on right of the dialog box marked **Selected**.
4. Click **OK**. You should see three new columns on the table for the percents.
5. Run the tabulation by clicking  on the toolbar, or pressing **Ctrl+R**. When CSPro prompts you to save the changes, click on **Yes**.
6. Select **MyData.dat** as the data file to tabulate, as in the previous exercise.

When you have completed this step you should see a table that looks something like:



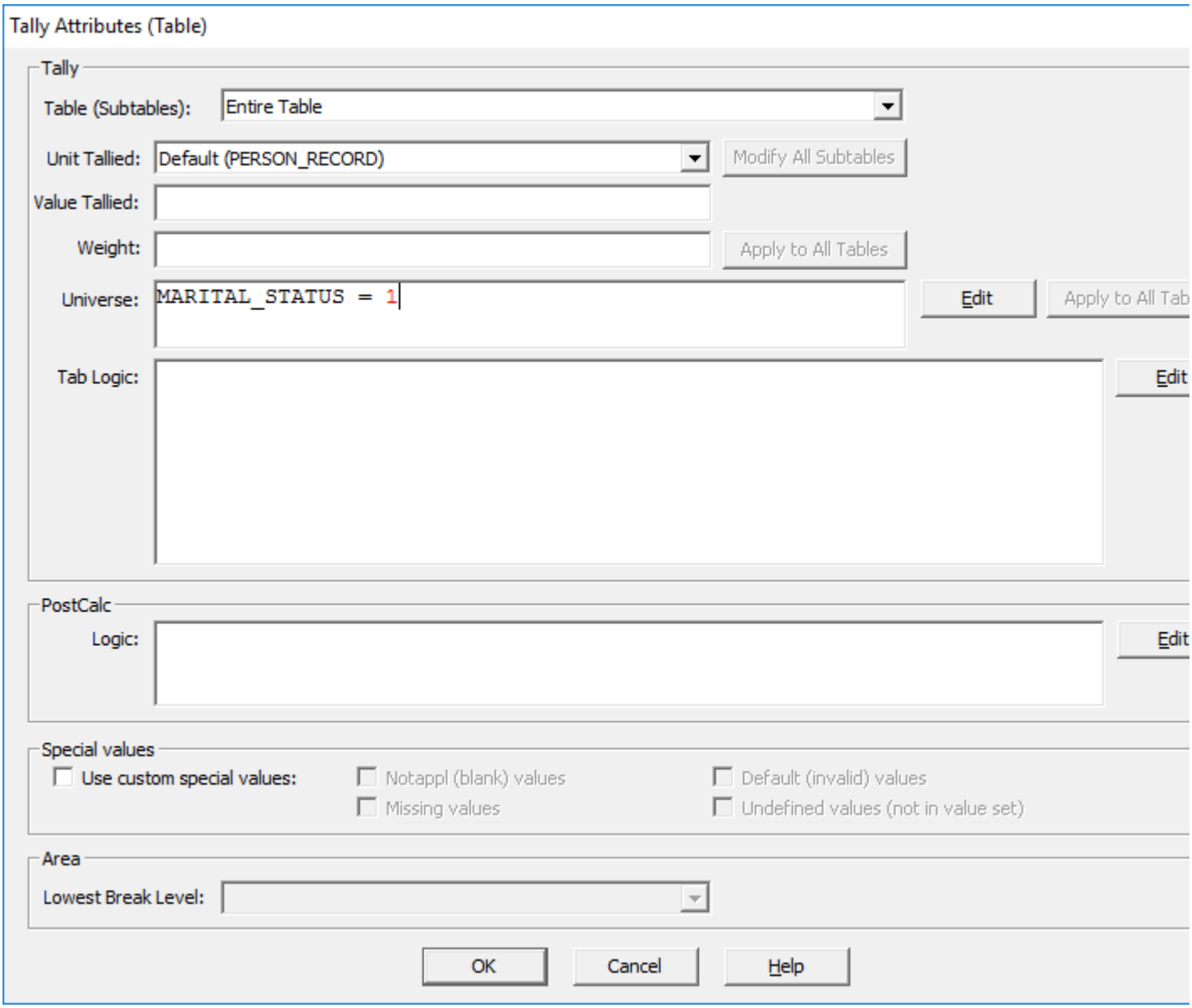
Age	Sex					
	Total	Percent	Male	Percent	Female	Percent
Total	4	100.0	3	100.0	1	100.0
0 - 9	1	25.0	1	33.3	-	-
10 - 19	1	25.0	1	33.3	-	-
20 - 29	-	-	-	-	-	-
30 - 39	-	-	-	-	-	-
40 - 49	2	50.0	1	33.3	1	100.0
50 - 59	-	-	-	-	-	-
60 - 69	-	-	-	-	-	-
70 - 79	-	-	-	-	-	-
80 - 89	-	-	-	-	-	-
90 - 99	-	-	-	-	-	-

Continue to the next step: Step 2: Add a Universe.

Step 2: Add a Universe

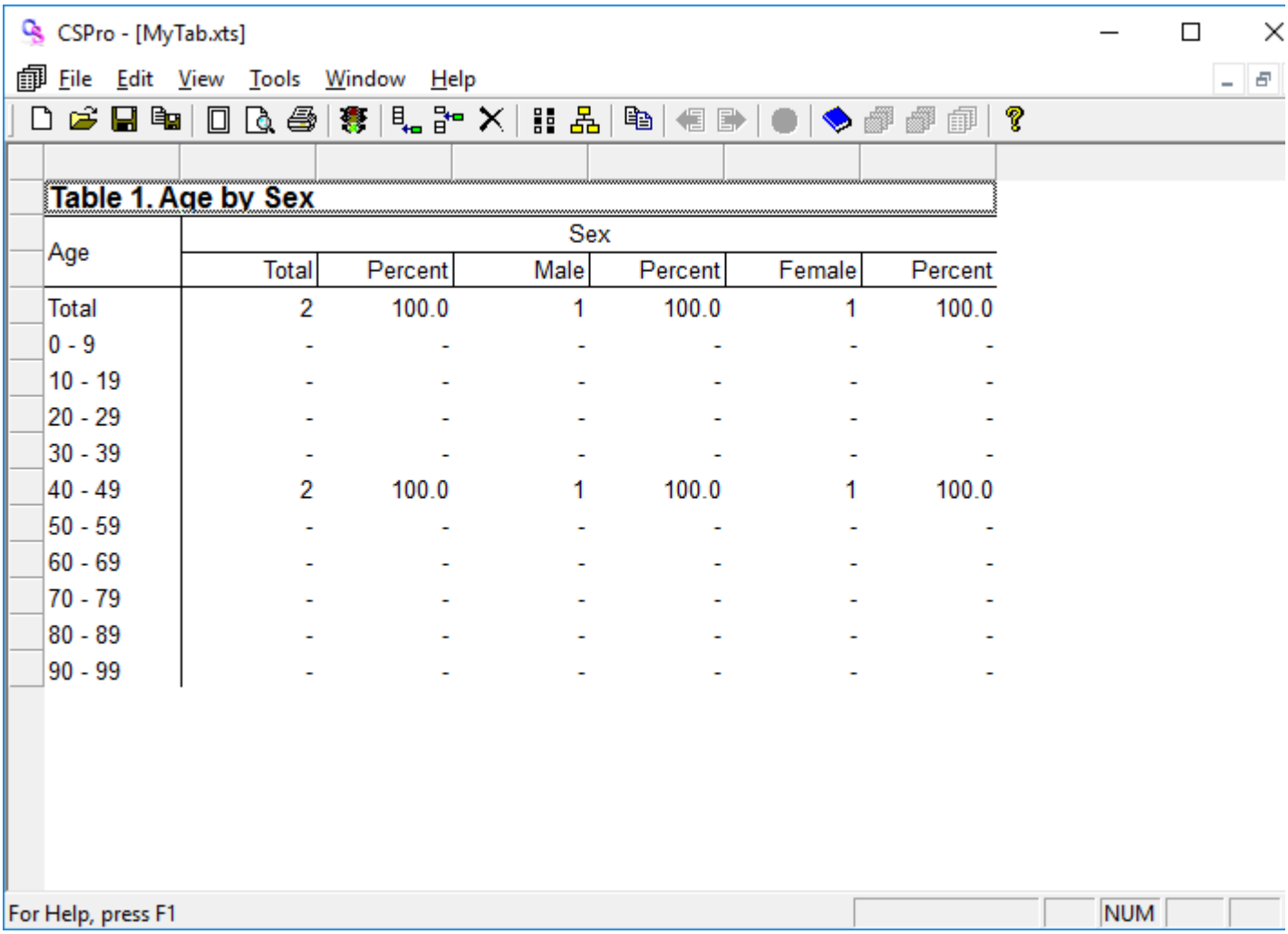
(Exercise 6, Modify the Table)

We will now add a universe to our table. A universe is a filter, or a way of restricting the table to a subset of the data records that meet a certain condition. In this step we will run the table for married people.



1. Right-click anywhere on the table.
2. Select **Tally Attributes (Table)** from the right-click menu.
3. In the section of the dialog box marked **Universe**, type `MARITAL_STATUS = 1`. Be sure to type this correctly, otherwise you may see the message "Invalid Universe Syntax."
4. Click **OK**.
5. Run the tabulation by clicking on the toolbar, or pressing **Ctrl+R**. When CSPro prompts you to save the changes, click on **Yes**.
6. Select **MyData.dat** as the data file to tabulate, as in the previous exercise.

When you have completed this step you should see a table that looks something like the following. Notice that the counts are lower than in the previous step because we are not counting unmarried people.

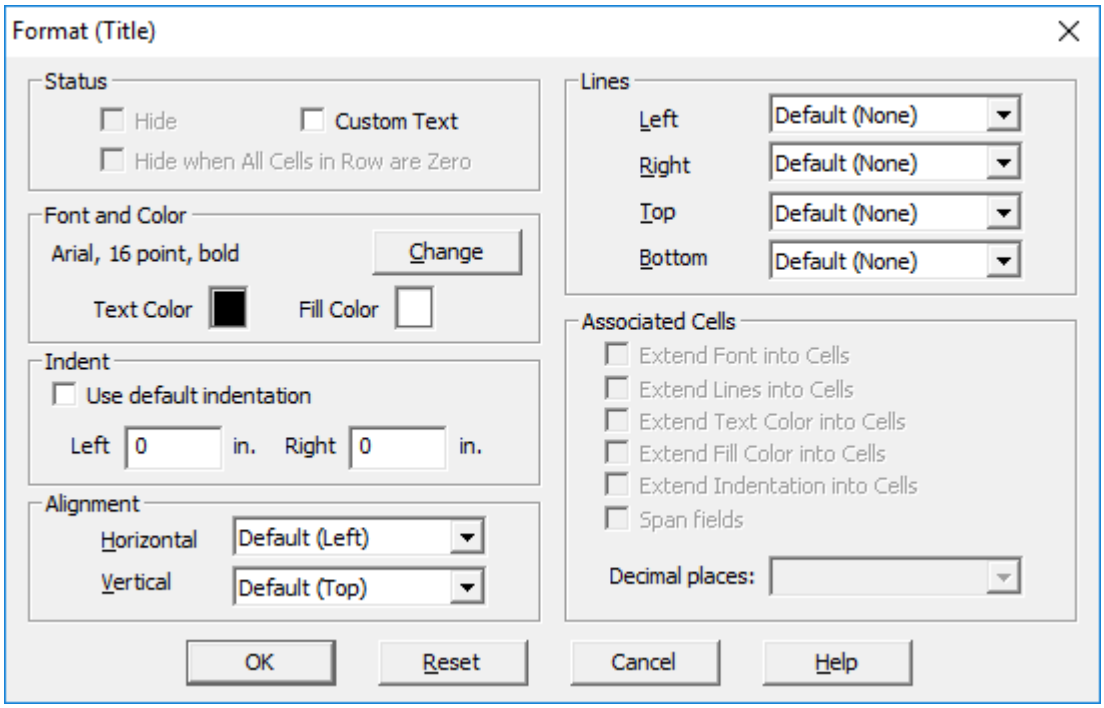


Continue to the next step: Step 3: Change the Title Font.

Step 3: Change the Title Font

(Exercise 6, Modify the Table)

CSPro gives you great control over the format of your tables. As an example, in this step we will change the font of our table's title to make it bigger.



1. Right-click on the title **Table 1. Age by Sex** at the top of the table.
2. Select **Format (Title)** from the right-click menu.
3. In the section of the dialog box marked **Font and Color** click on the **Change** button.
4. In the **Font** dialog box that appears, change the **Size** from **12** to **16**.
5. Click **OK** to close the **Font** dialog box.
6. Click **OK** to close the **Format (Title)** dialog box.

When you have completed this step you should see that the title is now larger.

This completes this exercise. Continue to the next exercise: Step 1: Write Logic for the Edit.

Exercise 7: Add Edits to the Data Entry Application

Step 1: Write Logic for the Edit

(Exercise 7, Add Edits to the Data Entry Application)

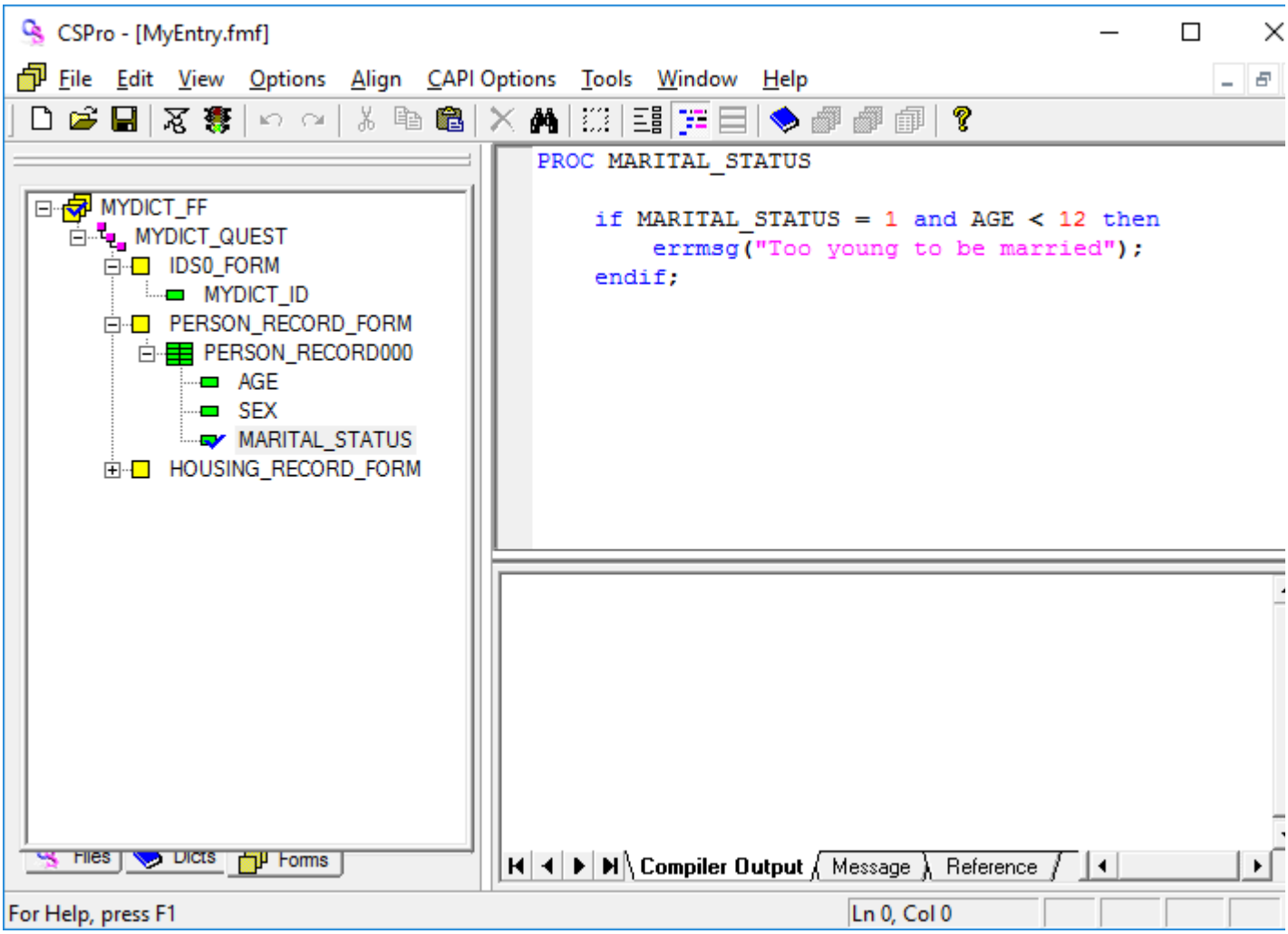
We will now return to the data entry application. We will introduce a check to make sure that married people are at least 12-years-old. In our data entry application, we will perform this check immediately after the keyer enters the marital status.

If you still have your cross tabulation application open from previous exercises, close it now. Select **File** -> **Close** from the main menu. CSPro may prompt you to save changes. Select **Yes**.

1. Open the data entry application we created earlier. Click on  on the toolbar, or select **File** -> **Open** from the main menu. Click on the application name, **MyEntry.ent**, and click **Open**.
2. Get ready to write logic by clicking  on the toolbar, or pressing **Ctrl+L** or selecting **View** -> **Logic** from the main menu.
3. Press **Ctrl+T** to show names instead of labels in the forms tree.
4. Click on the **+** next to **PERSON_RECORD_FORM** then click on the **+** next to **PERSON_RECORD000** then click on MARITAL_STATUS. The frame on the right hand side of the screen should show `PROC MARITAL_STATUS` at the top.
5. Note that `PROC` is short for procedure. We put our logic in the procedure for MARITAL_STATUS because we want it to execute immediately after the operator keys this field.
6. Type in the logic code exactly as you see below.

```
PROC MARITAL_STATUS

    if MARITAL_STATUS = 1 and AGE < 12 then
        errmsg("Too young to be married");
    endif;
```



Continue to the next step: Step 2: Compile the Logic.

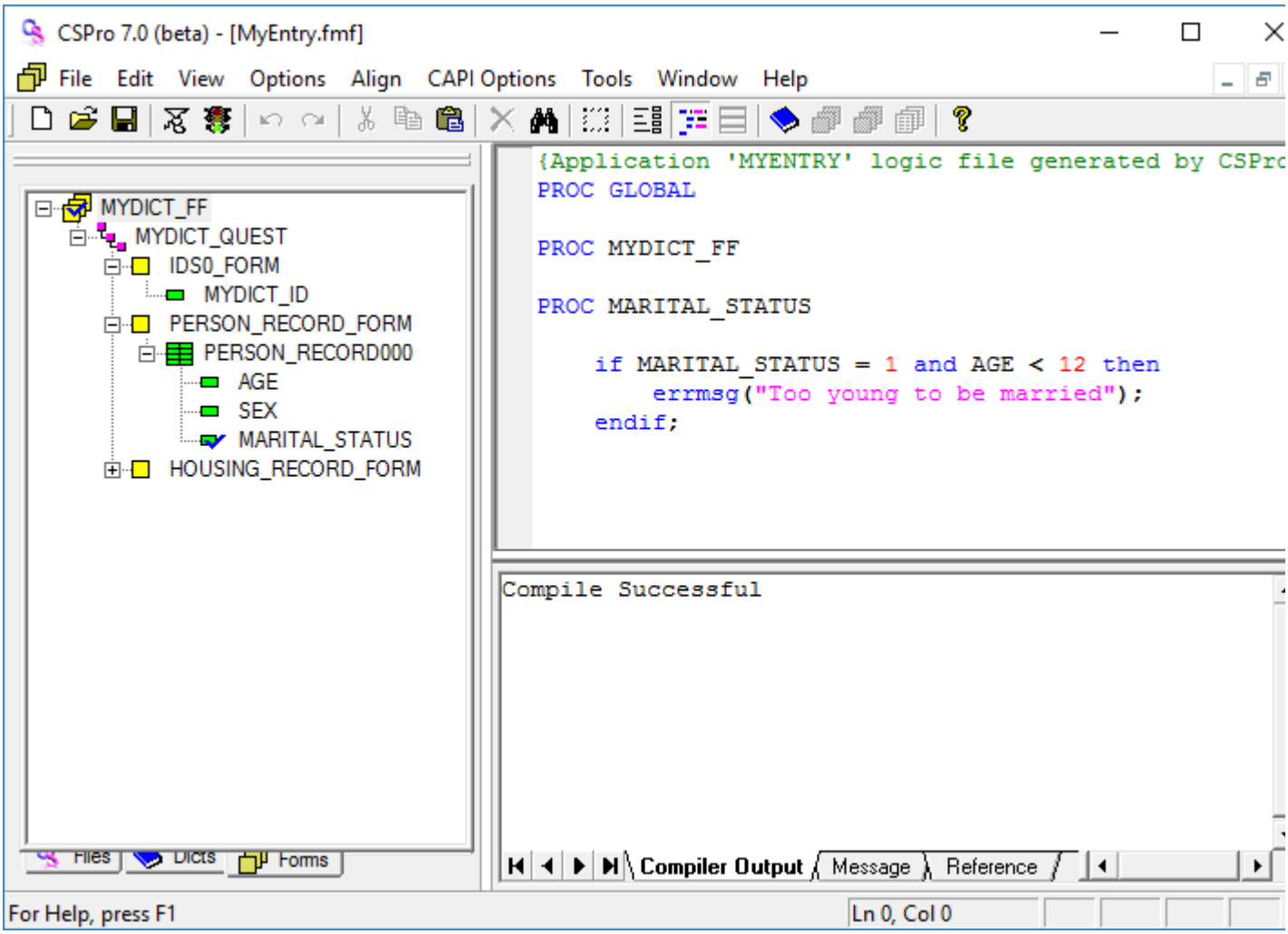
Step 2: Compile the Logic

(Exercise 7, Add Edits to the Data Entry Application)

You have typed logic in the CSPro language. Like all procedural languages, the system must check to make sure that there are no syntax errors. This is called compiling.

1. Click on **MYDICT_FF** in the forms tree to show all the CSPro logic.
2. Compile the logic by clicking on the toolbar, or pressing **Ctrl+K** or selecting **File** -> **Compile** from the main menu.
3. If you typed the logic correctly, you will see **Compile Successful** in the **Compiler Output** window under the logic.
4. If you see a dialog box that says **Compile Failed**, you have typed something incorrectly. A red circle will appear in the margin indicating the approximate location of the error. The **Compiler Output** tab at the bottom of the screen will show you an error message to help you determine the error. Check very carefully to make sure you typed in exactly what was shown in the previous step.

When you have completed this step the screen should look something like:



Continue to the next step: Step 3: Test the Edit.

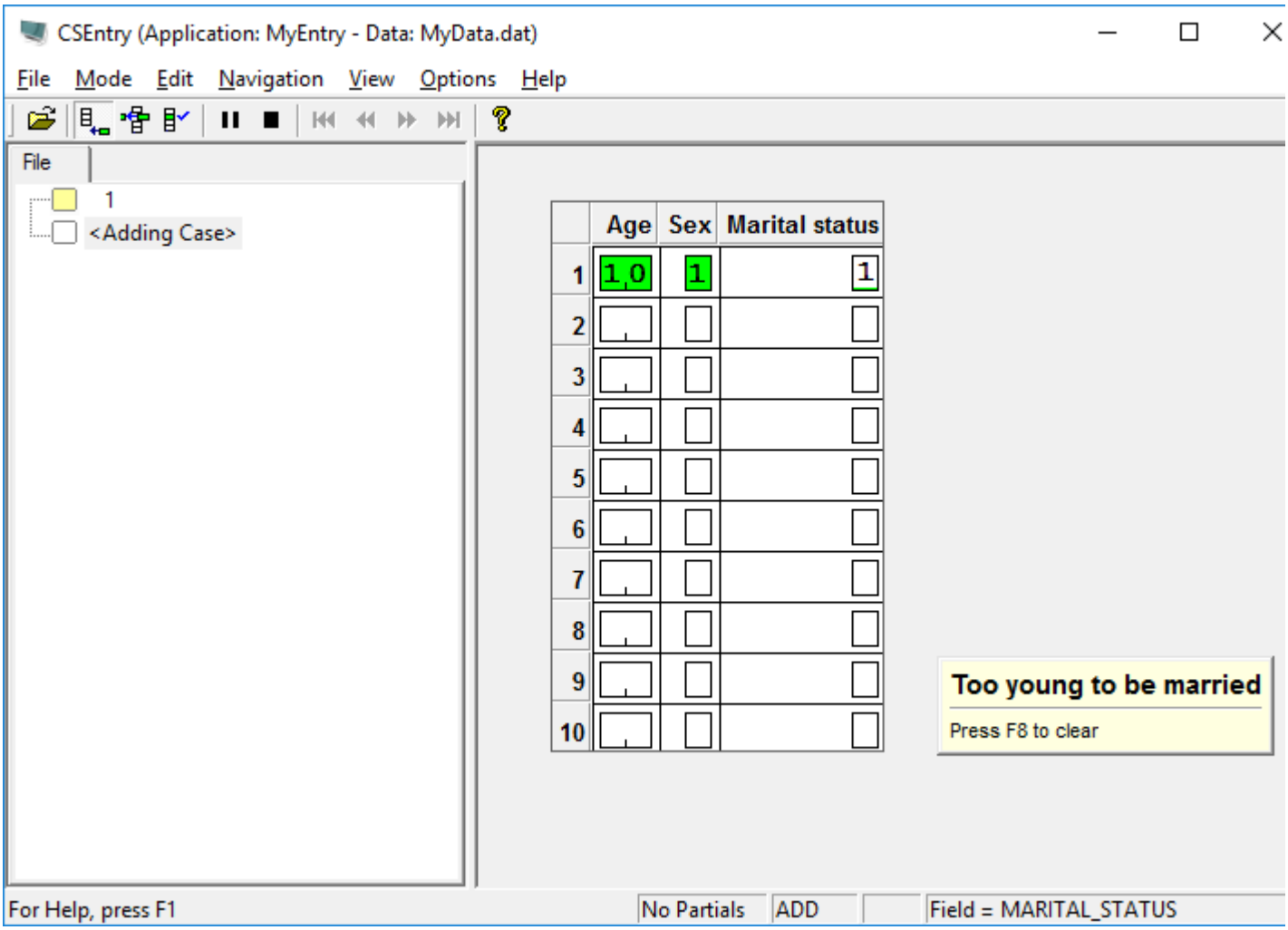
Step 3: Test the Edit

(Exercise 7, Add Edits to the Data Entry Application)

We are now ready to run the data application and make sure our logic is working properly.

1. Run CSEntry by clicking on the toolbar, or pressing **Ctrl+R**.
2. CSPro will ask you to save the changes. Click **Yes**.
3. CSEntry will ask you to select a data file. Type **MyData.dat** for the file name, if it is not already there, then press **OK**.
4. Type in any **Operator ID**.
5. Click on on the toolbar, or press **Ctrl+A** to enter **Add** mode. The first form will appear with the cursor on **MyDict identification**.
6. Type **2** and then **Enter** to fill in the ID item. The next form will appear, showing the person roster.
7. Type **10** in the **Age** field.
8. Type **1** in the **Sex** field.
9. Type **1** in the **Marital status** field.

Your error message should appear on the screen as shown below.



Continue to the next step: Step 4: Complete the Case.

Step 4: Complete the Case

(Exercise 7, Add Edits to the Data Entry Application)

We will finish entering data for the second case, including the error condition, so that we will be able to test that condition in the following exercise.

1. Press **F8** to clear the message.
2. Hold down the **Ctrl** key and press the slash key **/** on the numeric keypad. The next form will appear on the screen.
3. Type **1** in the **Type household** field.
4. Type **1** in the **Type roof** field.
5. CSEntry will ask us to accept the case. Select **Yes**.
6. Click ■ on the toolbar, or press **Esc** or **Ctrl+S**, or select **Mode** -> **Stop** from the main menu.
7. Close CSEntry by clicking on the **X** in the top right corner, or selecting **File** -> **Exit** from the main menu.

This completes this exercise. Continue to the next exercise: Step 1: Create a Batch Application.

Exercise 8: Run a Batch Application

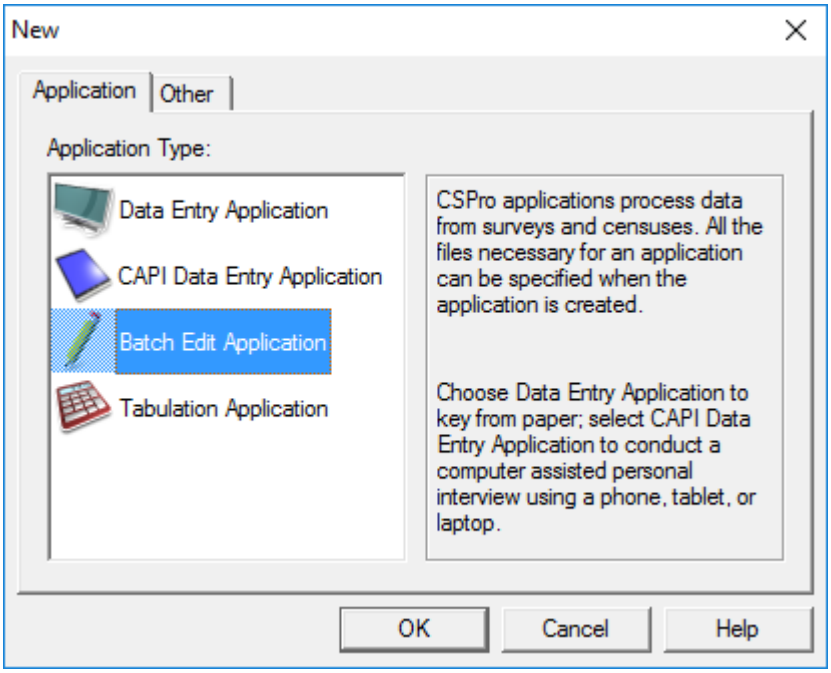
Step 1: Create a Batch Application

(Exercise 8, Run a Batch Application)

In the previous exercise we wrote logic to perform an edit interactively, i.e. at the time of data entry. In this exercise we will apply the same logic in a batch application, i.e. after data entry. Our logic will check the data and produce a report telling us about any errors.

If you still have your data entry application open from previous exercises, close it now. Select **File** -> **Close** from the main menu. CSPro may prompt you to save changes. Select **Yes**.

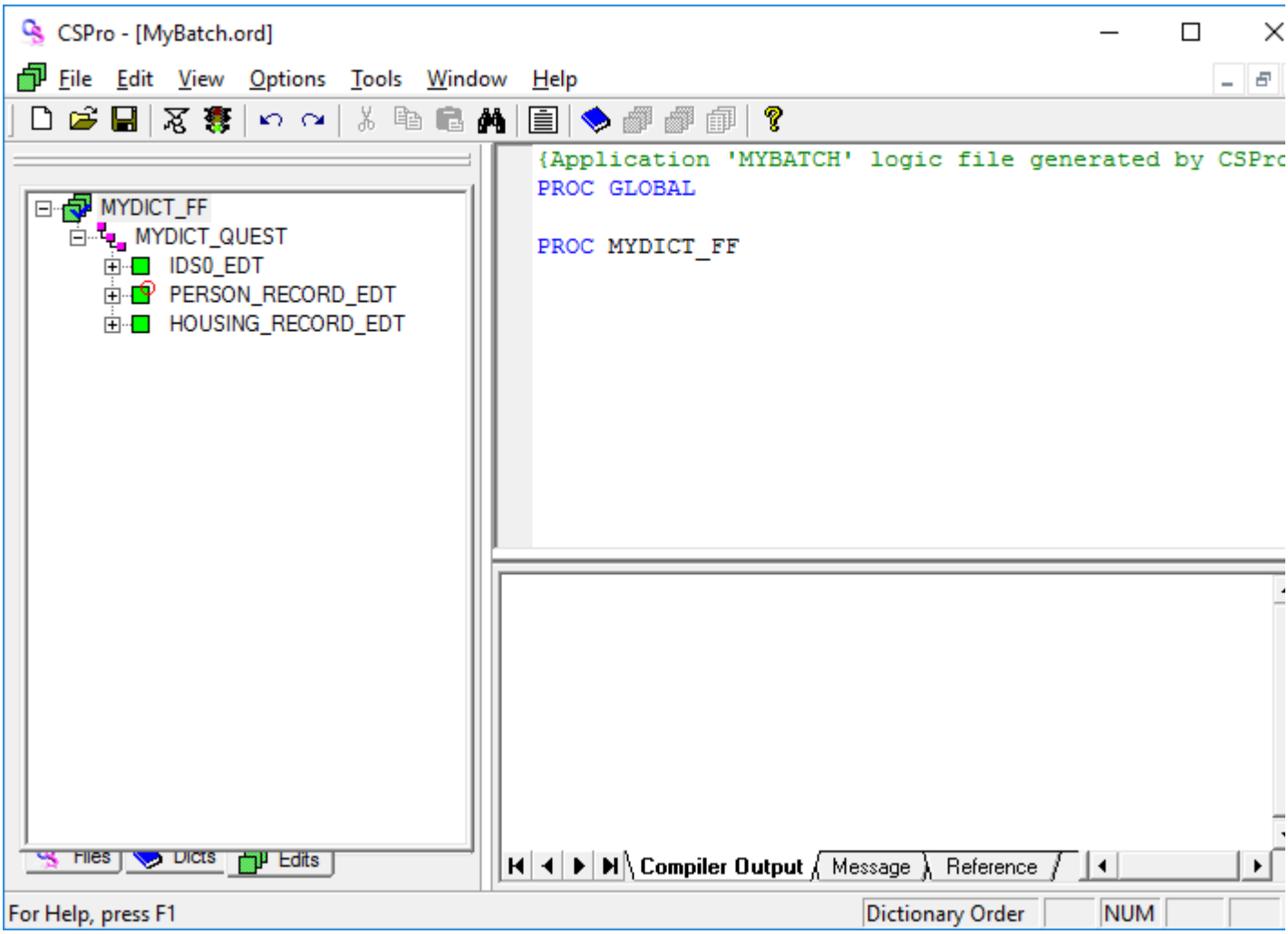
We will now create a batch application using the Wizard, as we did previously.



1. Select **File** -> **New** from the main menu, or click on the toolbar.
2. Select **Batch Edit Application** and press **OK**.
3. In the file open dialog box, enter **MyBatch** as the file name for the application.
4. Make sure you are located in the folder you created for these exercises (**C:\CSProTutorial**).
5. Press **Save**.
6. The next screen will ask you to select the Input Dictionary.
7. Change the name to **C:\CSProTutorial\MyDict.dcf**.
8. Press **OK**.

You are now ready to begin designing your batch edit application.

When you have completed this step the screen should look something like:



Continue to the next step: Step 2: Write Logic and Compile.

Step 2: Write Logic and Compile

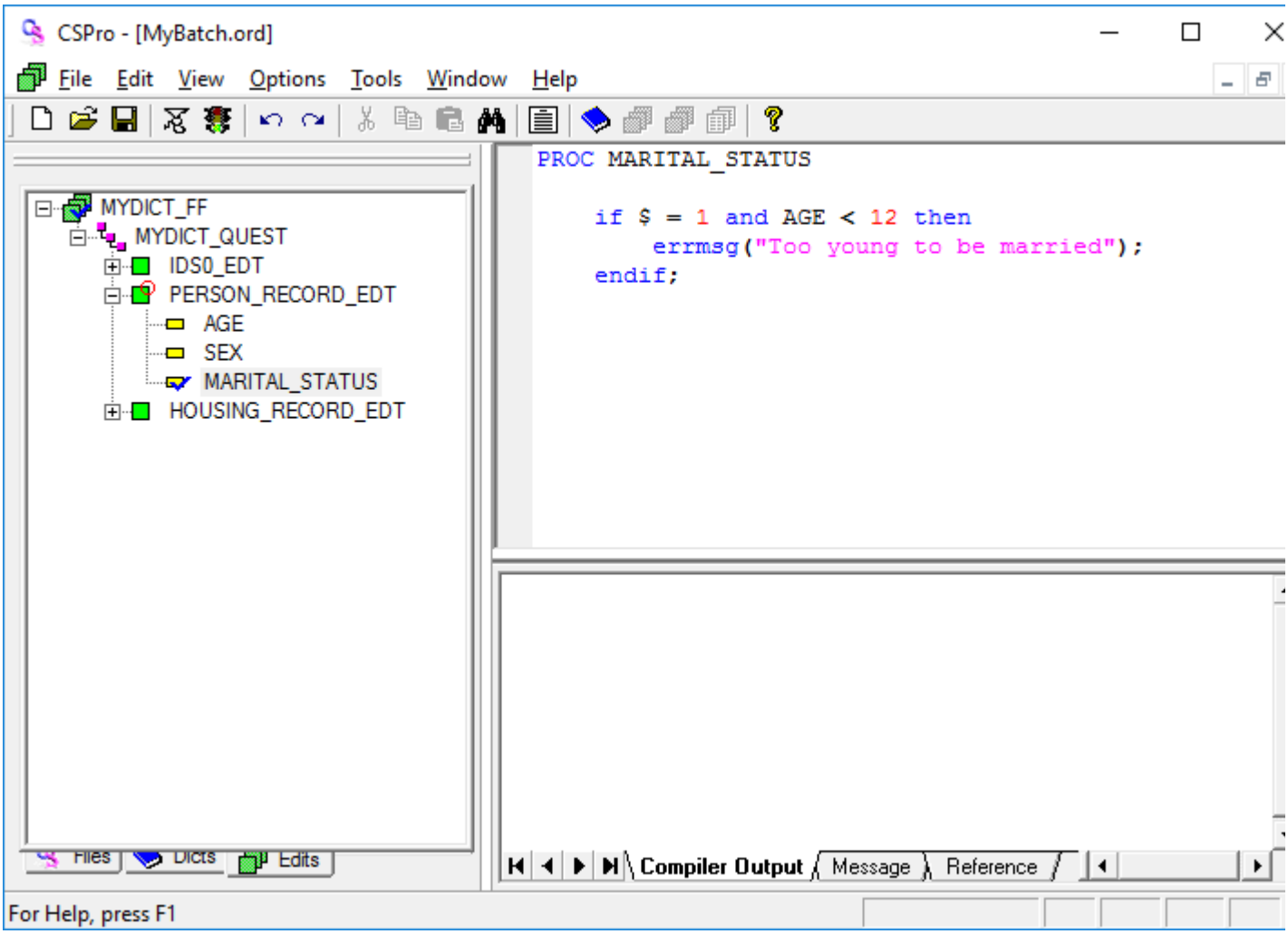
(Exercise 8, Run a Batch Application)

We will write the same logic we used in the previous exercise.

- Press **Ctrl+T** to show names instead of labels in the edits tree.
- Click on the **+** next to **PERSON_RECORD_EDT** then click on MARITAL_STATUS. The frame on the right hand side of the screen should show `PROC MARITAL_STATUS` at the top.
- Type in the logic exactly as you see below.
- Note that we used `$` in place of MARITAL_STATUS. This is the same thing because the logic is inside the procedure for MARITAL_STATUS. In the CSPro language, `$` is a short way of saying "this item."
- Compile the logic by clicking on the toolbar, or pressing **Ctrl+K** or selecting **File** -> **Compile** from the main menu.
- Correct any errors until you see **Compile Successful**.

```
PROC MARITAL_STATUS

    if $ = 1 and AGE < 12 then
        errmsg("Too young to be married");
    endif;
```



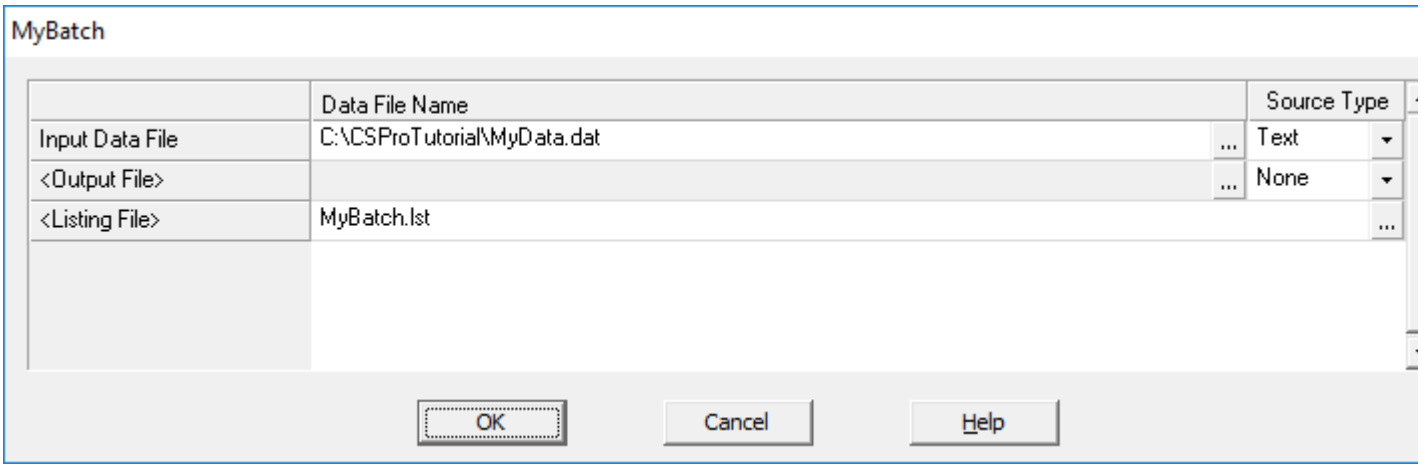
Continue to the next step: Step 3: Run the Batch Application.

Step 3: Run the Batch Application

(Exercise 8, Run a Batch Application)

Your batch application is now ready to run. CSBatch is the name of the program that runs this application. We will use the data file you created in the previous exercise.

1. Run CSBatch by clicking on the toolbar, or pressing **Ctrl+R**.
2. CSPro will ask you to save the changes. Click **Yes**.
3. CSBatch will ask for some data file names. Click in the empty box next to **Input Data File** and type in **MyData.dat** and click **OK**.



CSBatch will now run your program.

Continue to the next step: Step 4: Examine the Output Report.

Step 4: Examine the Output Report

(Exercise 8, Run a Batch Application)

The output report will appear in the CSPro Text Viewer. It will look something like:

```
Application     C:\CSProTutorial\MyBatch.bch
Type            BATCH
Input Data      <<Text File>> C:\CSProTutorial\MyData.dat
<Output>        <<Empty>>

Date            Jun 5, 2020
Start Time      07:11:00
End Time        07:11:00

CSPRO Process Summary
         +-------------------------------------------------------+
         |       7 Records Read ( 100% of input file)            |
         |       0 Ignored (       0 unknown,        0 erased)   |
         |       1 Messages (       1 U,       0 W,       0 E)  |
         +---------+-------------+-------------+-------------+
         |  Level  |  Input Case |  Bad Struct |  Level Post |
         +---------+-------------+-------------+-------------+
         |     1   |          2  |          0  |          2  |
         +---------+-------------+-------------+-------------+


Process Messages

*** Case [   2] has 1 messages (0 E / 0 W / 1U)
   U    -9 Too young to be married

User unnumbered messages:

  Line    Freq  Pct.  Message text                                                  Denom
  ----    ----  ----  ------------                                                  -----
     9       1    -   Too young to be married                                        -

CSPRO Executor Normal End
--------------------------------------------------------------------------------
```

The first several lines show file names and the date and time of the run.

CSPro Process Summary

- The first line tells us that the data file had seven records.
- The second line tells us that there were no problems with the structure of the data file.
- The third line tells us that one **user** message was triggered by our logic. The system did not issue any **warning** or **error** messages.
- The last line tells us that our data file has two cases in it.

Process Messages

This section shows messages by case by case. In our example we only triggered one message, so only one case is shown. **Case [2]** shows us the case ID; in this example the second case has the error.

User Unnumbered Messages

This section shows a summary by message, Since we have only `errmsg` command in our logic, there is only one line. The number **9** under **Line** tells us the line number of the `errmsg` command in our logic. The number **1** under `Freq` tells us that this message was only triggered once for the data file.

Conclusion

When you have finished examining the report, close Text Viewer by pressing **Esc** or selecting **File** -> **Exit** from the main menu.

Congratulations! You have completed the CSPro tutorial. We hope you are now ready to try creating and running your own applications. Please refer to our User's Guides for more details. You can access them from CSPro simply by selecting **Help** -> **Help Topics** from the main menu of any CSPro module.