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## **AIMMS Tutorial for Professionals - Getting Acquainted**

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# Chapter 5

## Getting Acquainted

In this chapter, you will create your first very small AIMMS model plus an end-user page that requires minimal effort. The main purpose of this chapter is to give you a quick introduction to the basic functionality of AIMMS.



*This chapter*

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### 5.1 Starting a new project

Assuming that AIMMS 3 has already been installed on your machine, execute the following sequence of actions to start AIMMS:


*Starting AIMMS*


- ▶ press the **Start** button  in the taskbar,
- ▶ go to the **All Programs** submenu,
- ▶ select and click on the AIMMS 3.x icon  to start AIMMS. If this icon is not present in the list of all programs, you should look in the **AIMMS** program group.

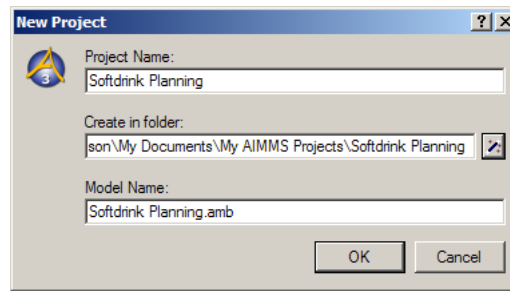
Next you will see the AIMMS splash screen. Once AIMMS is ready for use the splash screen will disappear and the AIMMS window will open and display the **Start Page**. Should you encounter the AIMMS **Tip of the Day** dialog box, please close it, because it is not relevant at this point.

Press the **New Project** button , which is located in the leftmost position on the AIMMS toolbar. The dialog box shown in Figure 5.1 will then appear, requiring you to take the following actions:


*Creating a new project from within AIMMS*

- ▶ specify 'Softdrink Planning' as the project name,
- ▶ press the **Wizard** button  to select, e.g., the folder 'C:\Documents and Setting\Jay Johnson\My Documents\My AIMMS Projects\' for your AIMMS projects, and
- ▶ press the **OK** button.

Note that AIMMS will automatically extend the project folder with the project name. This automatic facility is linked to the use of the **Wizard** button . If you enter the project folder by hand, no automatic extension takes places and AIMMS will accept the folder name as you specified.

Figure 5.1: The **New Project** wizard

Having completed the **New Project** wizard, AIMMS will open the **Model Explorer** (see Figure 5.2) for the ‘Softdrink Planning’ project, and you are ready to specify your model.

You will notice that the AIMMS toolbar has been extended with a project toolbar  to help you further develop the model and its associated end-user interface. The available tools are:

*Project toolbar*

- the *Model Explorer*,
- the *Identifier Selector*,
- the *Page Manager*,
- the *Template Manager*,
- the *Menu Builder*,
- the *Data Manager*, and
- the *Data Management Setup* tool.


These tools can be accessed through the **Tools** menu as well.

Alternatively, you can use the right-mouse popup menu command **New-AIMMS Project File** from within the Windows Explorer to create a new project from scratch. In that case, the **New Project** wizard shown in Figure 5.1 will automatically pop up, and the new AIMMS project will be created in the current subdirectory.

*Creating a new project from within the Windows Explorer*

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## 5.2 The Model Explorer

Once a new project is created, the **Model Explorer** will be opened automatically, and the initial model tree as shown in Figure 5.2 will be shown. The **Model Explorer** can also be opened manually by pressing the **Model Explorer** button  on the toolbar or by pressing the *F8* key. In the initial model tree you will see a predefined empty *declaration section* together with three predefined *procedures*.

*Opening the Model Explorer*

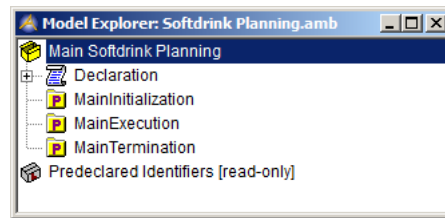




Figure 5.2: The initial model tree


### 5.2.1 Entering a set identifier

The declaration of model identifiers requires you to first expand the declaration node by double-clicking on the scroll icon  (and not on the name itself). Instead of double-clicking you can open the declaration section by pressing the right arrow key after first having selected the corresponding node in the model tree. Once you have opened the declaration section, the **New Identifier** buttons  on the toolbar will be enabled.

*Opening the declaration section*

To create a set of locations you should take the following actions:


*Creating the set Locations*

- ▶ press the **New Set** button  to create a set identifier in the model tree,
- ▶ specify 'Locations' as the name of the set, and
- ▶ press the *Enter* key to register the name.

There are alternative ways to create a new identifier using either the **Insert** command in the right-mouse pop-up menu or the *Insert* key.

For every node in the model tree, you can specify additional information as *attributes* belonging to that node. AIMMS lets you view and change the values of these attributes in an *attribute form*. To open an attribute form you can choose any one of the following possibilities:

*Opening an attribute form*

- select a node in the model tree and press the *Enter* key,
- double-click on the name of the node in the model tree, or
- select a node in the model tree and press the **Attributes** button .

You have now observed the different results obtained when double-clicking on either the *icon* or the *name* of an intermediate node. The first option opens a lower level in the model tree, while the second option opens the corresponding attribute form.

*Double-clicking on icon or name*

Next, you need to declare the index 1 as an attribute of the set Locations. You should first open the attribute form of the set Locations. The resulting initial attribute form is shown in Figure 5.3.

*The initial attribute form*

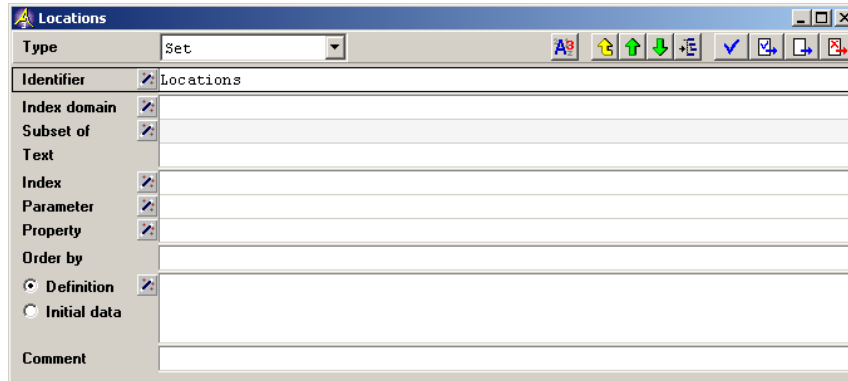




Figure 5.3: The initial attribute form of the set 'Locations'

To declare the index 1 as an attribute of the set Locations, execute the following sequence of actions:

*Declaring the index 1*

- ▶ move the mouse cursor to the **Index** attribute field, and click in the empty edit field,
- ▶ enter the letter '1' (without the quotes), and
- ▶ complete the attribute form by pressing the **Check, commit and close** button .

Instead of using the **Check, commit and close** button  you could have also used the *Ctrl-Enter* key combination to commit your changes. Figure 5.4 contains the resulting model tree.

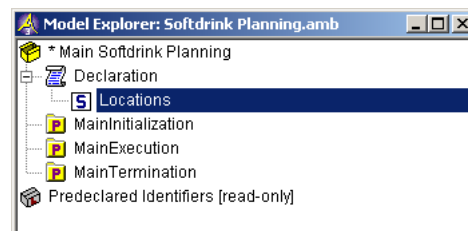




Figure 5.4: The intermediate model tree with the set Locations

The asterisk ('\*') on the left of the model node `Main Softdrink Planning` indicates that the edits to your project have not yet been saved to disk. To save your work, please press the **Save Project** button  on the toolbar. Alternatively, you could have used the `Ctrl-S` key combination.

*Saving your changes*

The declaration of a parameter is similar to the declaration of a set. In this chapter, two parameters are introduced to contain the geographical longitude ( $x$ ) and latitude ( $y$ ) coordinates of every location in the set `Locations`. To enter the parameter `XCoordinate(1)`, you should execute the following actions:


*Creating the parameter XCoordinate*

- ▶ press the **New Parameter** button  on the toolbar to create a new parameter in the model tree,
- ▶ specify '`XCoordinate(1)`' as the name of the parameter, and
- ▶ press the `Enter` key to register the name.

Note that parentheses are used to automatically add the index domain `1` to the identifier `XCoordinate`.

The parameter `YCoordinate(1)` can be added in the same way. Should you make a mistake in entering the information, you can always re-edit a name field by first selecting the corresponding node in the model tree followed by a single mouse click within the name field. Alternatively, you can use the `F2` key to enter edit mode.

*Creating the parameter YCoordinate*

You have now entered the set `Locations` and the two parameters `XCoordinate` and `YCoordinate`. The resulting model tree is shown in Figure 5.5. By pressing the `F5` key you can instantly check the validity of your model. You will only receive a message in the event of an error or warning. Once the validity of your model has been verified, you should save your work by pressing the **Save Project** button  on the toolbar.

*Checking your model*

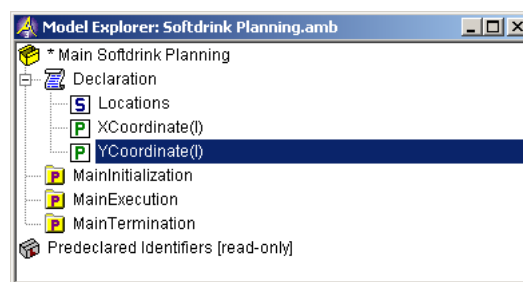


Figure 5.5: The model tree thus far

### 5.3 Reading data

To be able to briefly illustrate some AIMMS features at this point in the tutorial we will read in some initial data from an external text file named 'Locations.dat' located in the 'Data' directory. This file contains initial data for the set Locations as well as the corresponding coordinates for these locations.

*Data initialization*

To view the contents of the initial data file, you can open it with an external text editor or use the internal AIMMS text editor which can be accessed from the **File - Open - Text File...** menu. In the **Open File** dialog box you should select the 'All Files (\*.\*)' option to be able to select the file 'Locations.dat'. Figure 5.6 shows the result if you use the internal AIMMS text editor.

*Viewing text files*

l	XCoordinate	YCoordinate
Amersfoort	5.377	52.158
Amsterdam	4.88	52.376
Apeldoorn	5.953	52.213
Arnhem	5.917	51.982
Assen	6.561	53.011
Breda	4.778	51.588
'Den Bosch'	5.308	51.701
'Den Haag'	4.303	52.079
'Den Helder'	4.754	52.958
Deventer	6.158	52.263
Dordrecht	4.679	51.794
Eindhoven	5.461	51.432
Emmen	6.885	52.788
Enschede	6.89	52.22
Groningen	6.574	53.226
Haarlem	4.618	52.382
Leeuwarden	5.782	53.212
Maastricht	5.696	50.857
Nijmegen	5.845	51.84
Rotterdam	4.482	51.929
Tilburg	5.071	51.568
Utrecht	5.118	52.107
Venlo	6.158	51.374
Vlissingen	3.571	51.458
Zwolle	6.09	52.522 ;

Figure 5.6: The AIMMS internal text editor containing the file 'Locations.dat'


To instruct AIMMS to initialize its data using the file 'Locations.dat', you should now enter a read statement in the standard MainInitialization procedure. This procedure is automatically executed whenever the project is opened. To achieve this, you should perform the following actions:

*MainInitialization*  
...

- ▶ select the MainInitialization procedure node in the model tree,

- ▶ open its attribute form,
- ▶ specify the following line of text as its body argument:

```
read from file "Data\\Locations.dat";
```

- ▶ and complete the attribute form by pressing the **Check, commit and close** button 

Note that AIMMS uses the double backslash in the **Body** attribute of the MainInitialization procedure. The single backslash character has already been reserved by AIMMS to denote special characters inside strings. This choice corresponds to the conventions in the C programming language. For instance, '\n' denotes the 'return' character, and '\t' denotes the 'tab' character.

Figure 5.7 contains the attribute form of the procedure MainInitialization.

... and its  
attribute form



Figure 5.7: The completed attribute form of the MainInitialization procedure

To execute the MainInitialization procedure without having to reopen the project, you can:

Run procedure

- ▶ select the MainInitialization procedure in the model tree, and
- ▶ use the right mouse pop-up menu to issue the **Run Procedure** command (see Figure 5.8).

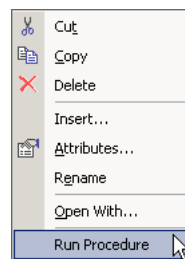




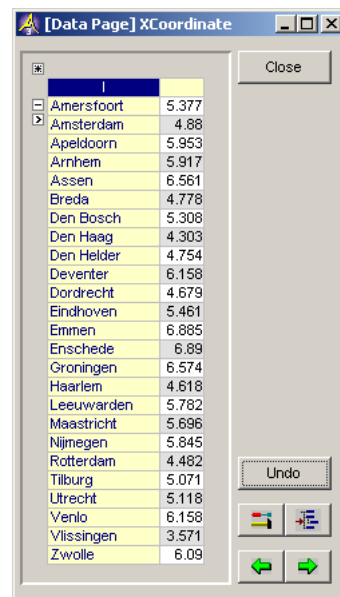
Figure 5.8: A right mouse pop-up menu

Once AIMMS has read the data file, all model identifiers are initialized. You can look at the current data values by opening one or more data pages. For instance, to open a data page for the identifier XCoordinate, you should perform the following actions:

*Data pages*

- ▶ select the XCoordinate parameter in the model tree, and
- ▶ use the right mouse pop-up menu to issue the **Data...** command.

The data page that will appear is displayed in Figure 5.9. By pressing the **Left Arrow** button  you will get the data page for the set of locations, while pressing the **Right Arrow** button  will lead to the parameter YCoordinate.



Location	Value
Amerfoort	5.377
Amsterdam	4.88
Apeldoorn	5.953
Arnhem	5.917
Assen	6.561
Breda	4.778
Den Bosch	5.308
Den Haag	4.303
Den Helder	4.754
Deventer	6.158
Dordrecht	4.679
Eindhoven	5.461
Emmen	6.885
Enschede	6.89
Groningen	6.574
Haarlem	4.618
Leeuwarden	5.782
Maastricht	5.696
Nijmegen	5.845
Rotterdam	4.482
Tilburg	5.071
Utrecht	5.118
Venlo	6.158
Vlissingen	3.571
Zwolle	6.09

Figure 5.9: The data page for the parameter XCoordinate



## 5.4 A first page

To illustrate some of AIMMS's graphical features, we can now make a page containing a network object displaying the locations geographically on a map. AIMMS uses the concept of pages to display data objects in the form of tables and graphs.

*Pages with objects*

To create a new empty page you should execute the following steps:

*Using the Page Manager*

- ▶ press the **Page Manager** button  on the toolbar (or alternatively, use the *F9* key),
- ▶ press the **New Page** button  on the toolbar to create a page,

- ▶ specify 'Locations' as the name of this new page, and
- ▶ press the *Enter* key to register the page.

The **Page Manager** with the new page is shown in Figure 5.10.

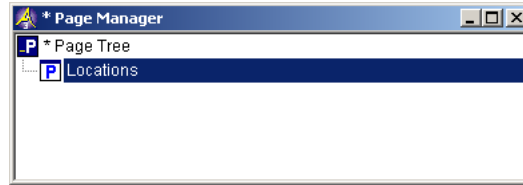


Figure 5.10: the **Page Manager** with a single page

Two important page modes are the **Edit** mode and the **User** mode. The **Edit** mode is used for creating and modifying the objects on a page. The **User** mode is for viewing and editing the data displayed within objects on a page.

*Two important page modes*


To open this new page in **Edit** mode:


*Opening the page*

- ▶ select the *Locations* page in the **Page Manager**, and
- ▶ press the **Edit Mode** button  on the toolbar to open the selected page in **Edit** mode.

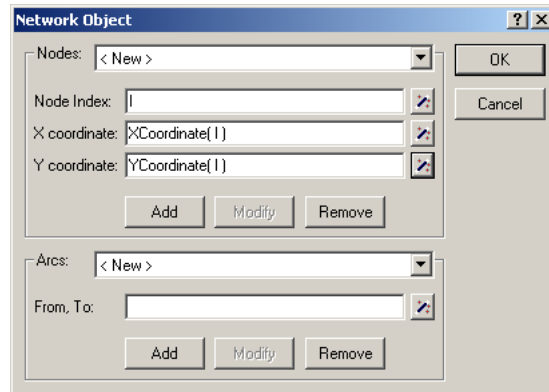
To create a new network object, perform the following actions:

*Drawing a new network object*

- ▶ press the **New Network Object** button  on the toolbar,
- ▶ position the mouse cursor where you like the upper left corner of the new object to be,
- ▶ press the left mouse button and drag the mouse cursor to a point on your screen such that the resulting rectangle has a height-width ratio of approximately 2, and
- ▶ release the mouse button.

The **Network Object** dialog box will appear. Please use the three **Wizard** buttons  on the dialog box to fill in the 'Node index', 'X coordinate' and 'Y coordinate' fields according to Figure 5.11. Note that in the 'Node Index' field you need to enter the character 'l' and not the number '1'.

*Network object identifiers*

Figure 5.11: The **Network Object** dialog box

After you have pressed the **OK** button, the network object created at this point should look like the one in Figure 5.12. By adding the appropriate background *Initial network object* bitmap, the locations will become more meaningful.

Figure 5.12: The initial **Network Object**

To furnish the network object with a background bitmap, you need to change its properties. To do so, you should perform the following actions: *Network bitmap*




- ▶ press the **Properties** button  on the toolbar to access the **Properties** dialog box,
- ▶ select the **Background** tab,
- ▶ click on the "No Image" at the right of **Background** property, press  button and select **From File** command from the popup menu,
- ▶ click on the value field of the **Image File Name**, press the  button, select the **Select File Name...** command from the popup menu, and select the filename 'Bitmaps\Netherlands.bmp',
- ▶ position the picture by entering 3.3 in the 'Left' edit field, 7.3 in the 'Right' edit field, 53.5 in the 'Top' edit field, and 50.7 in the 'Bottom' edit field,
- ▶ press the **Apply** button, but do not press the **OK** button yet.

Figure 5.13 shows the network object with the background bitmap.



Figure 5.13: The intermediate **Network Object**

The four values you just entered, position the bitmap to match the locations. These values reflect the longitude and latitude coordinates of the boundaries of the bitmap. Even though the bitmap and the locations are now consistent, the bitmap is not yet consistent with the size of the rectangle. The coordinates of the rectangle must be made consistent with the coordinates of the bitmap.

*Positioning the  
bitmap*

In a professional application one would typically use model identifiers to adapt the size of the rectangle, thereby controlling the zoom and scroll behavior of the network object. In this chapter the coordinates of the rectangle are set equal to the coordinates of the bitmap resulting in a tight match. To complete the layout of the network object you should do the following:

*Network area*

- ▶ select the **Network** tab,
- ▶ fill in the four edit fields as in Figure 5.14.
- ▶ uncheck all checkboxes, and
- ▶ press the **OK** button.

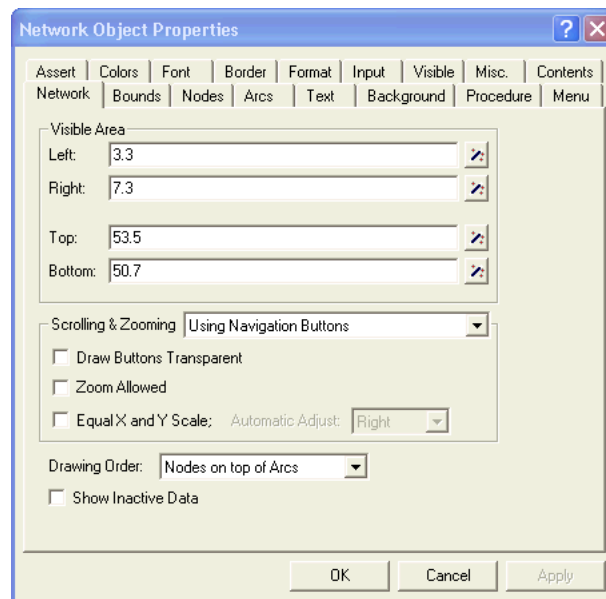




Figure 5.14: The **Network Properties** dialog box

The asterisk on the left of the tab title in the page indicates that the additions to your page have not yet been saved to disk. To save your work, press the **Save Project** button  on the toolbar.

*Saving your changes*

You are now ready to change the page to user mode by pressing the **Page User Mode** button  in the page toolbar. Your final network object should now look like the one in Figure 5.15. Note that the names of the cities are not part of the bitmap, but are superimposed based on the contents of the node set.

*View in User mode*



Figure 5.15: The final Network Object