2 Using the network editor

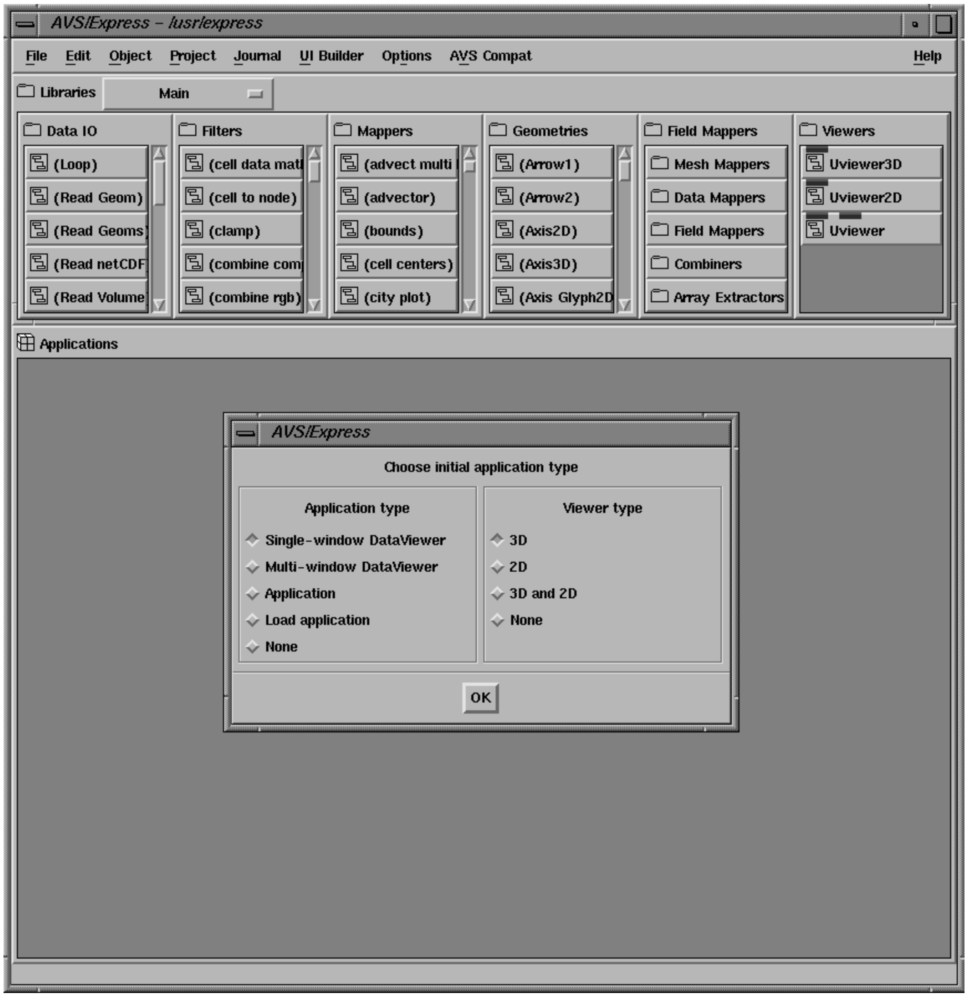
2.1 Aims of the chapter

The exercises in this chapter will illustrate the general features of the AVS/Express network editor. Exercise 1 is a simple example designed to take you through the data visualization process: starting AVS/Express, constructing networks, reading data, saving, loading and deleting applications and exiting from AVS/Express. Exercise 2 is a similar example for you to attempt on your own. In both cases, it is not necessary to create a field file in order to read the data. The creation of field files will be covered in subsequent chapters.

2.2 Exercise 1

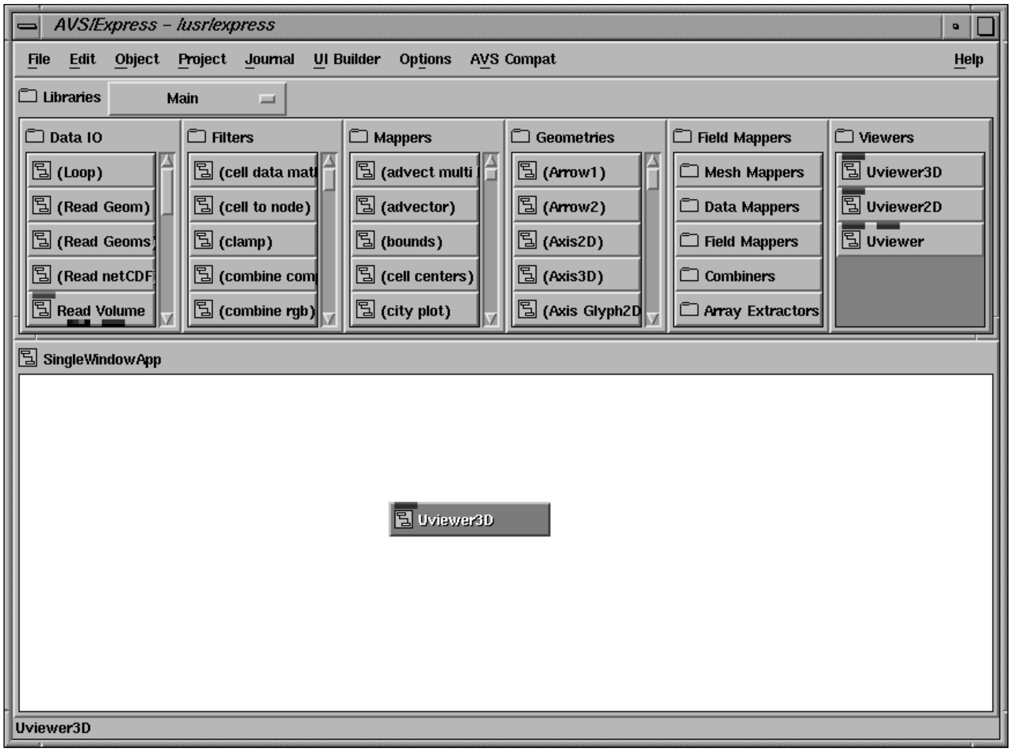
In this example we wish to visualize the electron density within a hydrogen atom. In particular we want to take a slice through the atom and observe differing electron densities throughout the atom.

2.2.1 Starting the AVS/Express Visualization Edition



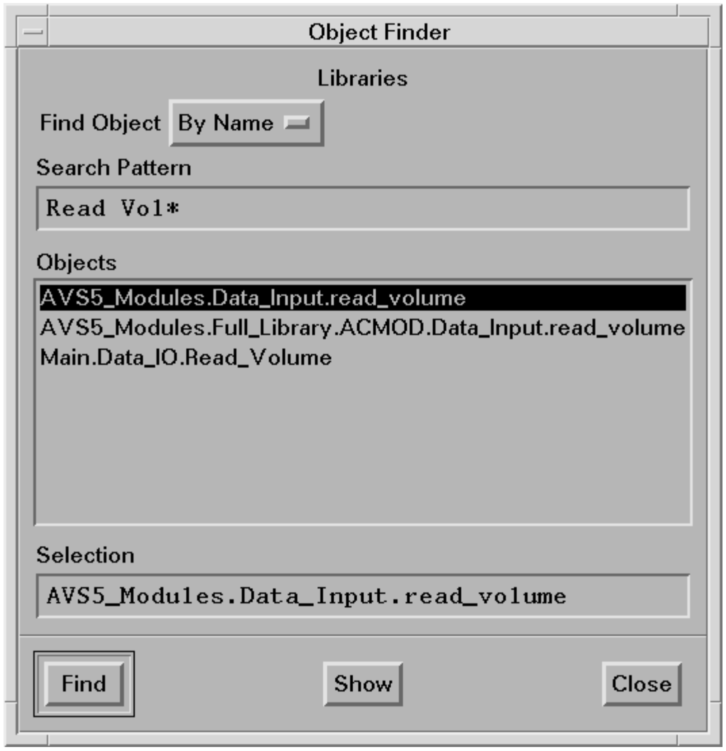
- To start AVS/Express Visualization Edition, simply type the following command:
  - `vxp`
- AVS/Express displays the network editor and a dialogue box in which you choose the initial type of application and viewer you want to use.
- Choose `Single-window DataViewer` with a `3D` viewer type (usually the best choice when constructing simple applications).
- Click on **OK** to proceed.

2.2.2 Structure of the network editor



- The screen should now show the above layout, which shows the major components of the network editor.
- The library of modules on view, above the application workspace area, is called **main**. This is the library which contains the major modules for network building. (Look at the popup menu to observe the other available libraries.) Within the main library the modules are divided into sub-libraries:
  - **Data IO**
  - **Filters**
  - **Mappers**
  - **Geometries**
  - **Field mappers**
  - **Viewers**
- **Data IO** contains the various modules for reading data and **Viewers** contains the various modules for viewing data. The other sections are used to build up the intermediate parts of a network in order to manipulate the data for a specific application.

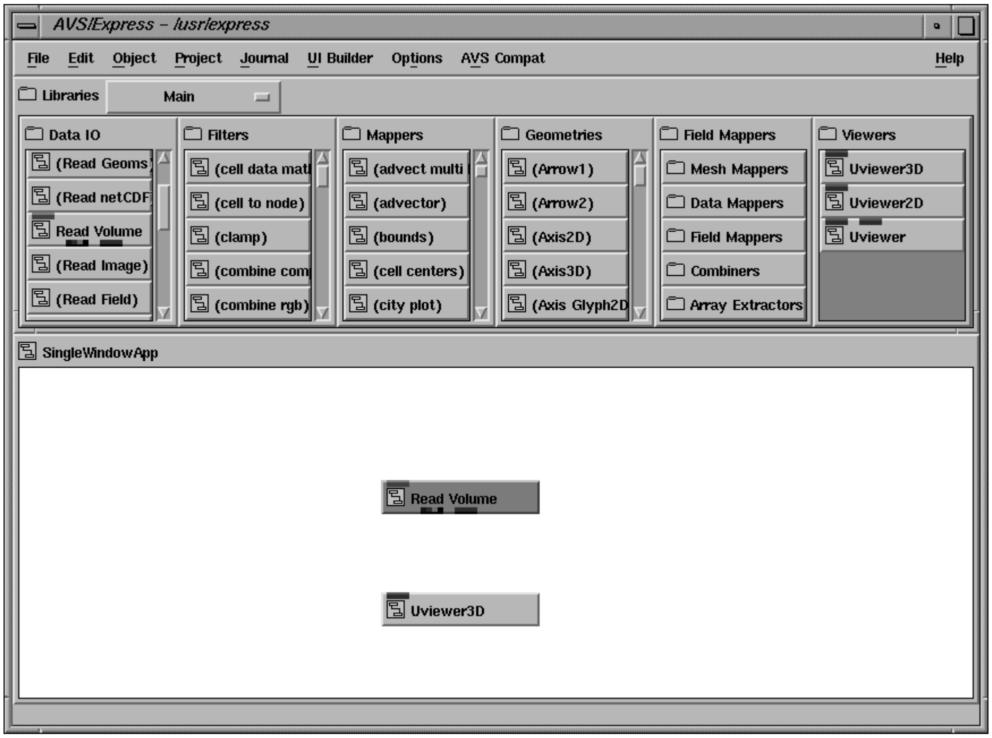
2.2.3 Using the object finder



When selecting modules for a network you can either scroll through the sub-libraries until you locate the correct one or alternatively you can use the **Object Finder** to search for a specific module. You can either search for a module in all libraries or in a specific library.

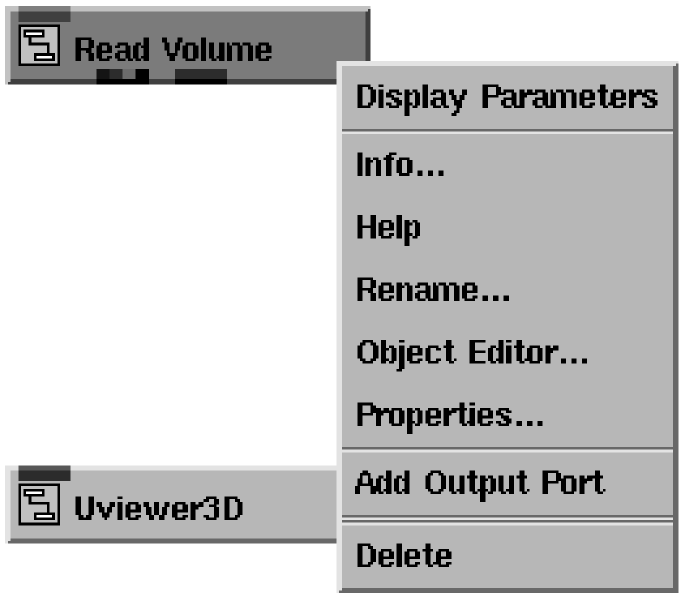
- *To search through all the AVS/Express libraries*: choose, **Find in All Libraries** from the **Object** menu, (located in the menu bar along the top of the network editor), and type in the name of the module in the **Search Pattern** box. Click **Find** and the location of the module will be given in the **Object box**. If you wish the location of the module to be highlighted in the network editor library click **show**.
- *To limit your search*: select the library or library page you want to search by clicking on it using the **left** mouse button. Now hold down the right mouse button to display the popup menu, and choose **Find** popup command. Alternatively, you can select the library page, and then choose **Find in Selected Library** from the **Object** menu and follow the same procedure as before.
- You can use the wildcard * to increase search flexibility. For example the above diagram shows a search for any modules which read volume data - type "`Read Vol*`" in the **Search Pattern** field.

2.2.4 Selecting a module



- Find the `Read_Volume` module which is located in the **Data IO** library.
- Point to the module using the mouse and press the **left** mouse button.
- While keeping the mouse button pressed drag the module onto the application workspace. When you are happy with its location release the button.
- The module will be instanced to the workspace.

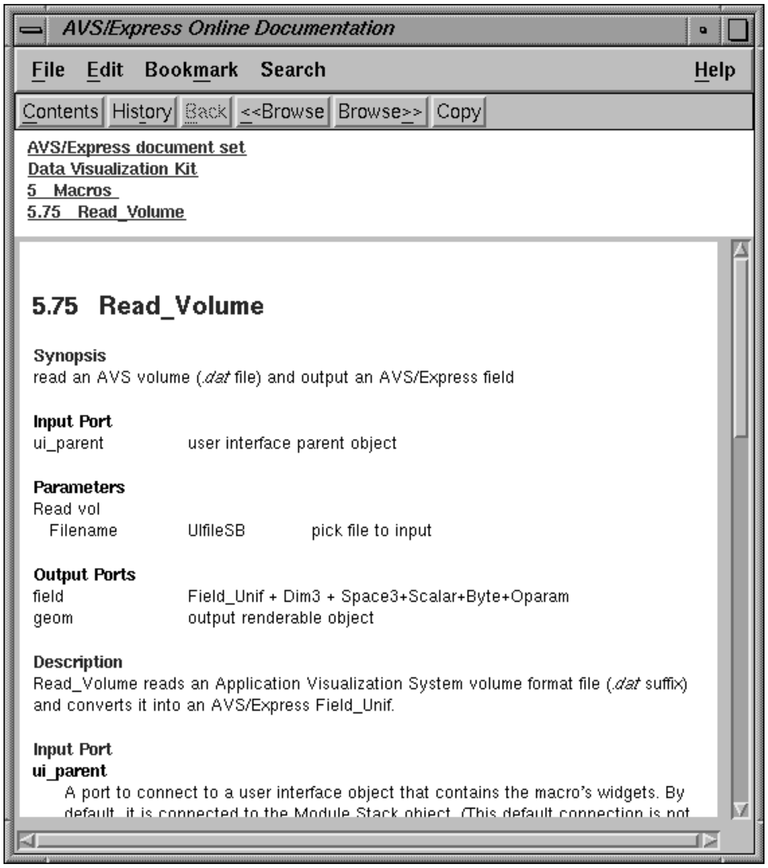
2.2.5 Deleting a module



To delete a module:

- Select it
- Hold down the **right** mouse button to display the popup menu
- Choose the **Delete** popup command
- When you release the mouse button the module will be deleted.

2.2.6 Accessing the help pages



To access the help pages for a particular module:

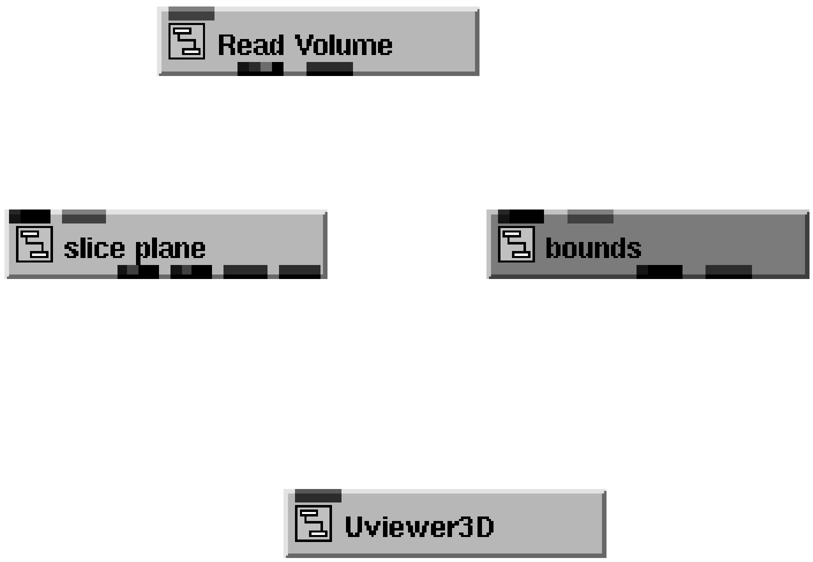
- Select the module and hold down the **right** mouse button to display the popup menu
- Choose the **Help** command.

Alternatively:

- Select the module
- From the **Help** menu on the menu bar at the top right of the network editor choose **On Selected Object**.

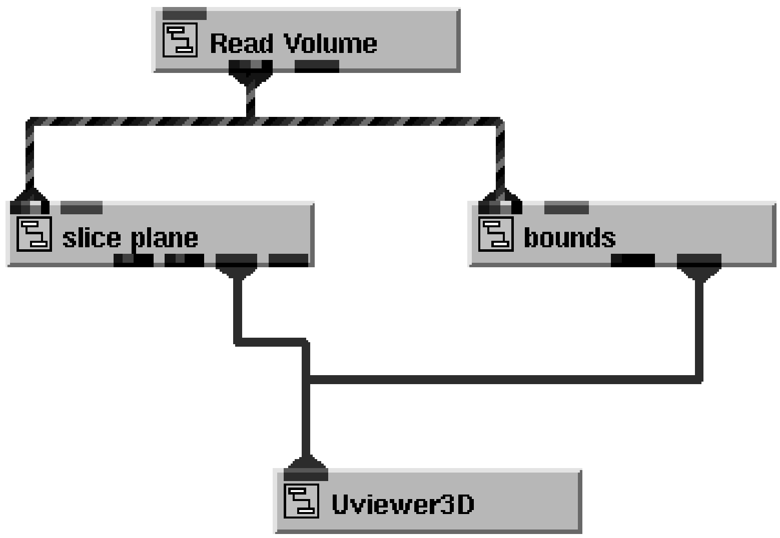
Both these routes will invoke the appropriate help page to appear.

2.2.7 Selecting the other modules



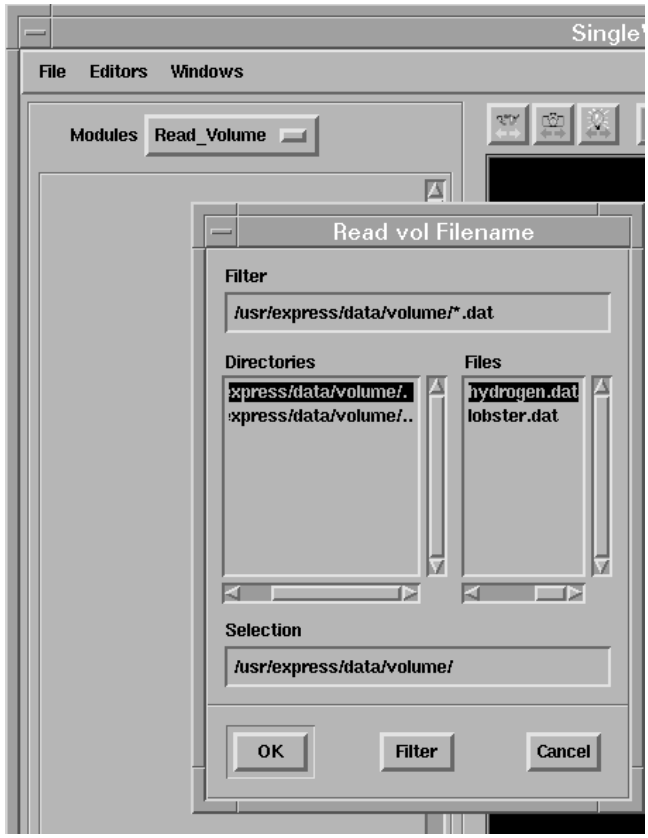
- Select the modules in the list below from the given sub-libraries and arrange them in the workspace as shown above.
    - `Read_Volume` (Data IO): reads a volume format file and converts it to a 3D AVS/Express field.
    - `bounds` (Mappers): generates a bounding box of a 3D field.
    - `slice_plane` (Mappers): extracts a 2D slice from a 3D field with an arbitrarily positioned slice plane.
    - `Uviewer3D`: (Viewers): creates a 3D image in the DataViewer.
- Try to locate at least one of the modules using the **Object Finder.**

2.2.8 Connecting the ports



- Connect the modules together to form the above network. It is important to make sure that the correct input/output ports are connected or the network will not perform the correct function. (Often AVS/Express will not let you make an incorrect connection or will produce an error message if one is made.)
- **Connecting modules**:
    - To connect module ports together move onto one of the ports you wish to connect with the mouse.
    - Now press the left button - all the possible connections are shown.
    - While keeping the button pressed move the mouse toward the other module port you wish to make the connection to. The connection should now become highlighted.
    - Release the mouse button and the connection is made.
- **Disconnecting modules:**
    - To disconnect a module connection move onto the module which is connected via its output port and "remake" the connection i.e. press the **left** button while positioned on this port, move toward the other port and when the connection between the two ports becomes highlighted, release the button.
    - The connection will be removed.

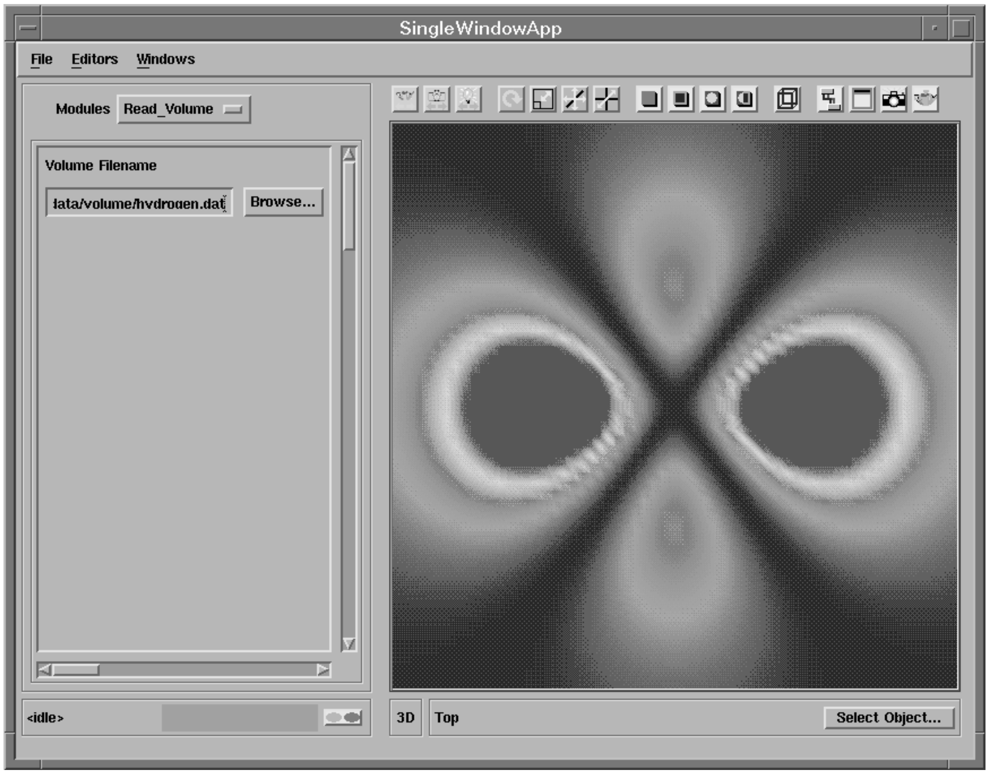
2.2.9 Reading a data file (1)



When a module is instanced to the workspace you can access controls for the module in the editor panel of the **DataViewer Pad**.

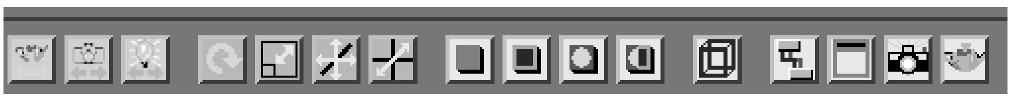
- Select the **Modules** command from the **Editors** pull-down menu. A menu of all modules instanced to the workspace will appear.
- Choose the `Read_Volume` module and press the browse button. The file browser should now appear.
- Use the file browser to change to the directory `/usr/express/data/volume` and click on the file called `hydrogen.dat`.
- The network will execute producing a picture in the viewer window located in the **DataViewer Pad.**

2.2.10 Reading a data file (2)



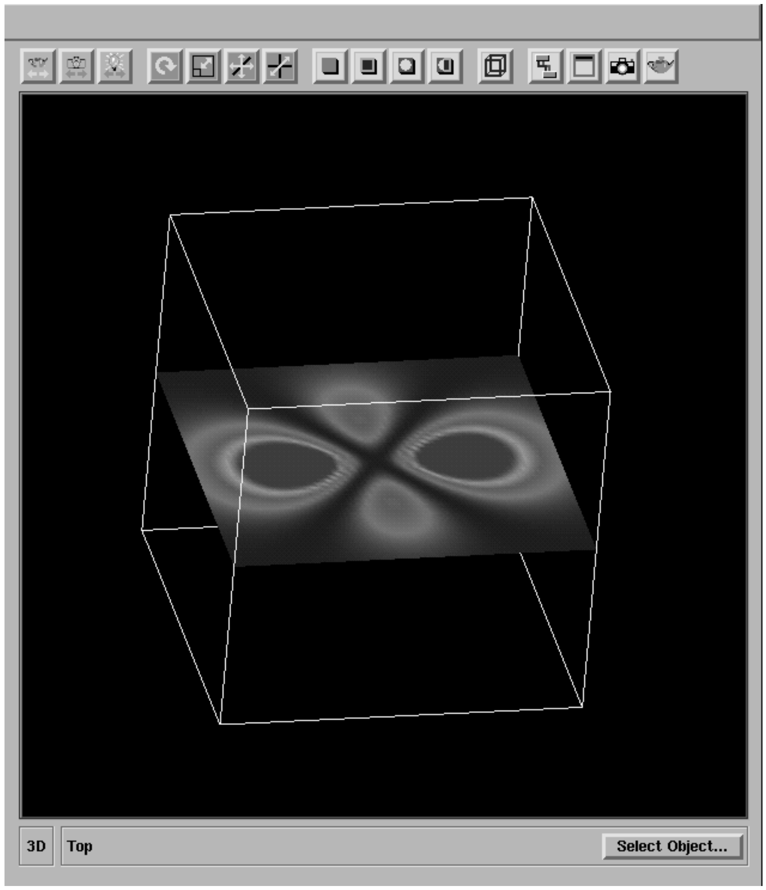
- The **DataViewer** window should display the above picture.
- Now that an image has been obtained,we want to manipulate the picture to the desired format.

2.2.11 Interacting with the objects (1)



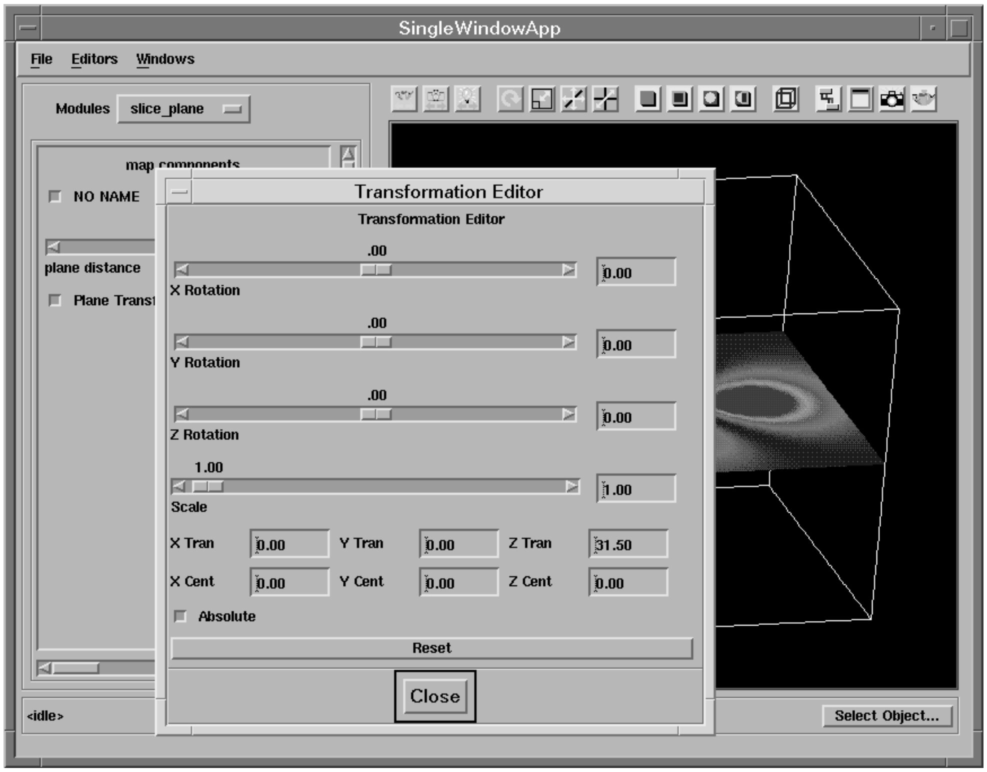
- The Toolbar, located in the **DataViewer** interface, provides a quick way to open **DataViewer** components and to manipulate images in the **DataViewer** window.
- Move the mouse over these icons to reveal a small label indicating the action the icon provides a short-cut to, e.g.
    - Transform mode selection, rotation, translate xy, translate z, and scale
    - Reset, normalize, and centre objects

2.2.12 Interacting with the objects (2)



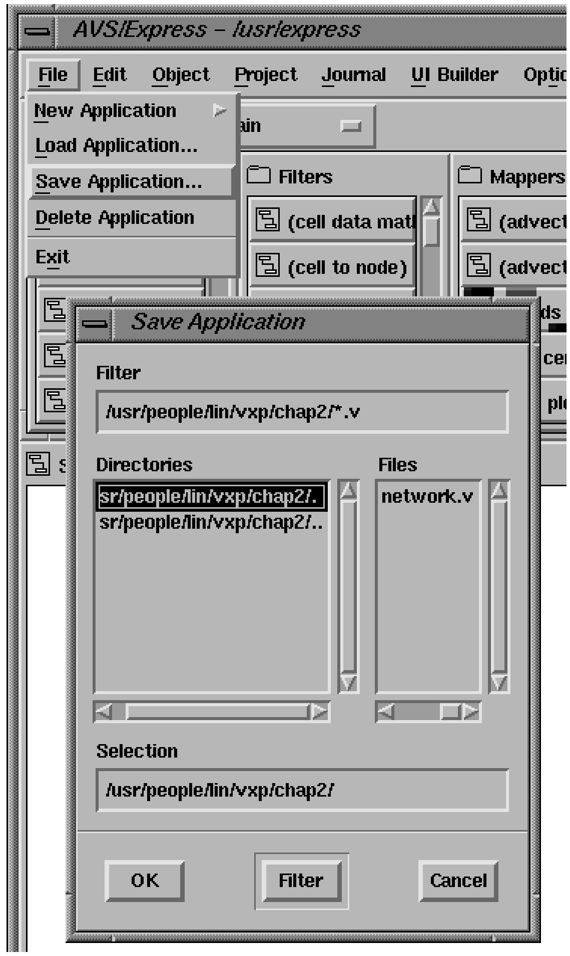
- Click on the **Reset/Normalize/Center** icon, and the full picture should appear in the viewer window.
- Now you can perform a few simple transformations on the image in the **DataViewer** window:
  - **scaling**: click on the `Scale` icon in the Toolbar, place the cursor in the window and, while holding down the **left** mouse button, move the cursor up and down to enlarge and shrink the object.
  - **rotating**: click on the `Rotate` icon in the Toolbar, place the cursor in the window and, while holding down the **left** mouse button, rotate the object.
  - **translating**: click on the `Translate` icon in the Toolbar, place the cursor in the window and, while holding down the **left** mouse button move the mouse to translate the object in the window.
- Manipulate the object until the scene appears similar to the one shown in the diagram above.

2.2.13 Changing the `slice_plane` parameters



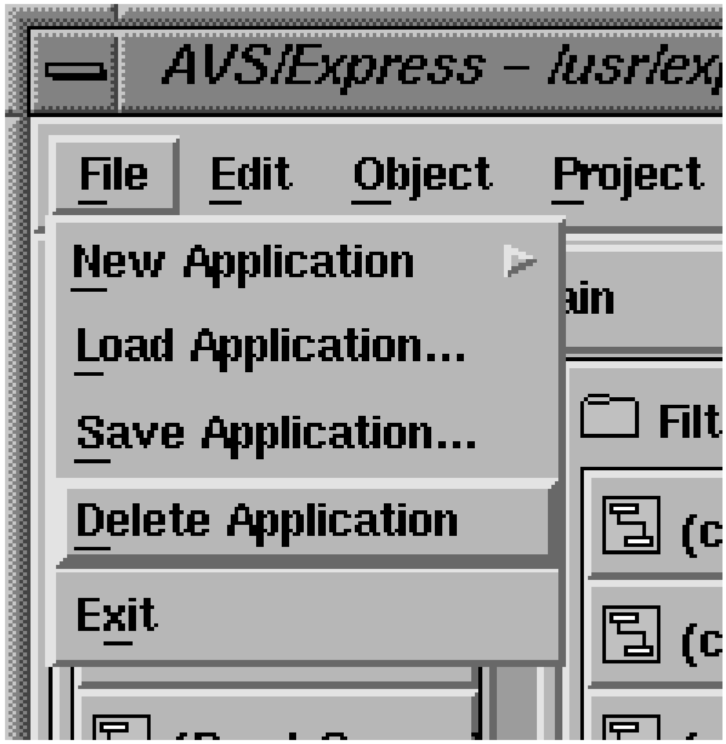
- Select the **Modules** command from the **Editors** pull-down menu, (or the Toolbar), and choose the `slice_plane` module. You can now try altering some of the parameters of the slice through the atom.
- You can alter the position of the slice through the atom by changing the value on the `plane distance` slider.
- Turn on the **Plane Transform Editor** - a series of sliders should appear. These sliders can be used to rotate and transform the slice in the x, y, & z directions and to scale it.
- Try altering some of the other slider parameters to alter the position of the slice.

2.2.14 Saving applications



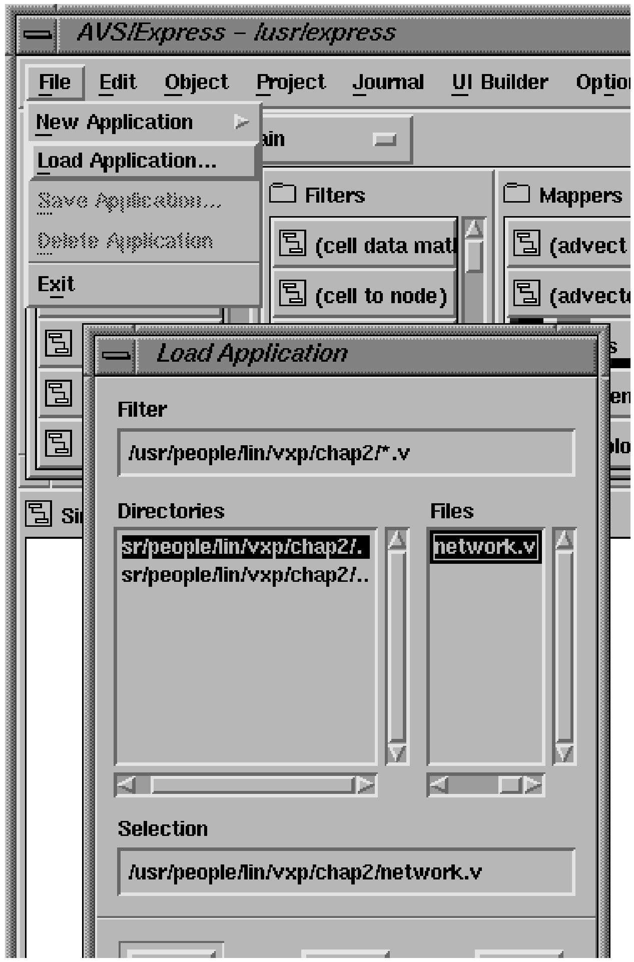
- The network can be saved as an application by selecting the **Save Application...** command from the **File** pull-down menu.
- A file browser will appear showing the files in your current working directory. Use the file browser to change the current directory to the one you want to save the file in. (It is best to save networks in your home directory or try `/tmp`.)
- A good convention is to always save the application network by typing in the file name followed by the file extension "`.v`", e.g. "`fred.v`".

2.2.15 Deleting an application



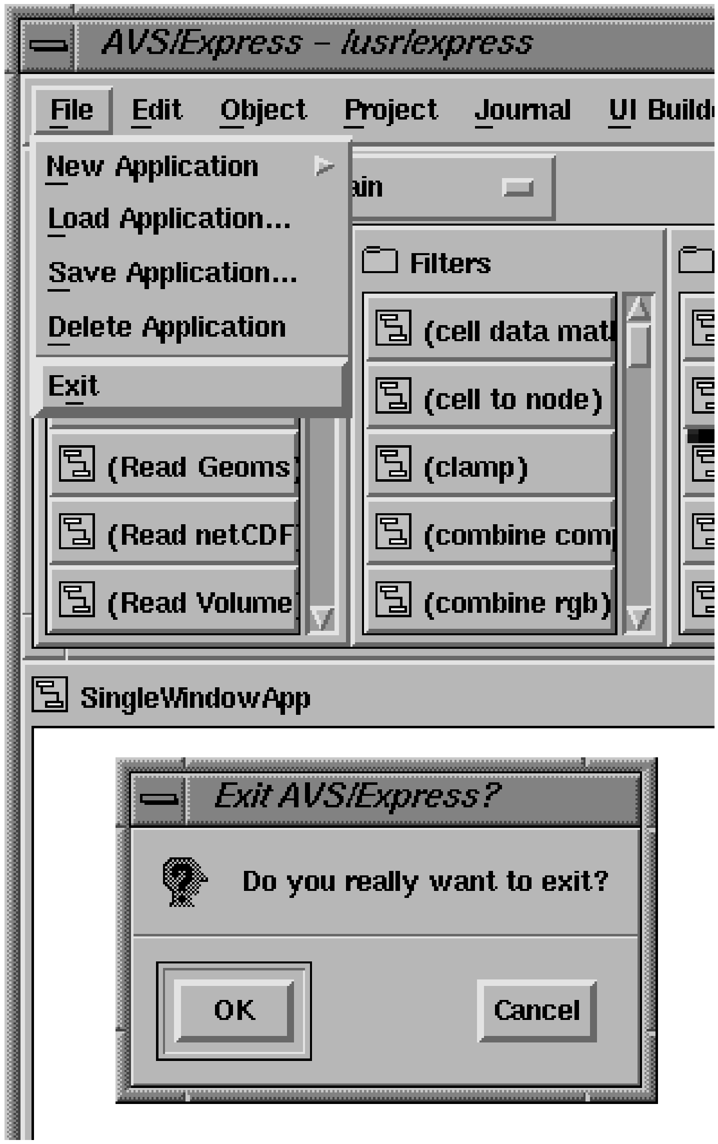
- To clear an existing application network from the workspace select the **Delete Application** command from the **File** pull-down menu.

2.2.16 Loading an application



- To load an application network select the **Load Application...** command from the pull-down **File** menu. A file browser will appear showing the files in your current working directory.
- Use the file browser to change the current directory to the one containing the saved application network.
- Click on the file name in the file browser window to load the application network.

2.2.17 Exiting from AVS/Express



- To exit from AVS/Express select the **Exit** command from the pull-down **File** menu.
- You will then be asked "Do you really want to exit?" in a popup window. Click the **OK** button if you still wish to exit.

2.3 Exercise 2

In this exercise we want to visualize the variation in bone-density through the body of a lobster.

- Use the same network as the one constructed in Exercise 1.
- When using the volume browser select the file `lobster.dat` and click **OK**.
- Using similar manipulation techniques as those described in Exercise 1, investigate the bone density of the lobster within its exoskeleton.
- Select the `bounds` module from the **Modules** menu and try altering some of the parameters.