# Introduction to MacProlog32

**Department of Computer Science**
**University of Wales, Cardiff**

*January 1997*

*Omer F. Rana*
*omer@cs.cf.ac.uk*
*Room S/2.03*

# 1 Introduction

This document gives a brief guide to using the **LPA MacProlog32** system on the Apple Macintosh. It is primarily aimed at those with little or no experience of Macintoshes and/or **MacProlog**. The document can also be obtained from the internet at
**http://www.cs.cf.ac.uk/User/O.F.Rana/prologpage.html**.

# 2 Booting the Machine

- Switch on your machine by pressing the arrow key at the top right corner of the keyboard. The key is set aside from the rest of the numeric pad at the top. If you have a problem, ask a friend.
- After a while the computer will start up with a series of icons appearing on the bottom of the screen. Please wait, this may take a while.

# 3 Macintosh environment

The desktop level window displays :

- a white line at the top of the screen with 5 menus : an apple icon and 4 other names. Each menu contains commands that can be selected (or executed) by positioning the cursor on top of the chosen menu, pressing and holding the mouse button while sliding down the mouse and finally releasing the mouse once the cursor is on top of the chosen command.
- A few icons on the right of the screen. The top one is the hard disk and the bottom one the *Wastebasket*, with a number of intermediate ones between them.
- The *Trash can* or *Wastebasket* is used to remove from your storage space any file or folder that is not required. Simply drag its icon (by position the cursor over the file or folder to be moved, and holding down the mouse button) onto the basket.
  **Note: Once information from the Wastebasket has been removed, it is irretrievable**.
- If you have no previous experience with Macintosh windows, spend a few minutes practising how to manipulate them, i.e. open, close, resize, move etc. You can do these by using the window frames (the boundaries of the windows). The *button areas* on the boundaries are used to perform these actions. Open a window by double clicking on the *Hard Disk* icon, and perform some basic window operations.
- Select *Chooser* from the left most menu in the top menu bar. This corresponds to the *apple* icon. Position the mouse over the icon and press the mouse button. Click on *Chooser* and familiarise yourself with the different types of printers connected to the network. For this course, from the Chooser menu, select **Apple Talk** and then printer **MP5**.
- **Warning :** : do not try to change the contents of the **system** area as this may cause severe disruption to the machine. Also, do not store your files in the **Wastebasket** as they may not be there when you come in next!!.

# 4 MacProlog environment

After the Macintosh has properly booted and a printer has been selected, open the **Applications** or **Hard Disk** icon, and then the **MacProlog** icon.

The **MacProlog** folder opens to reveal the available application tools. You can now enter the

MacProlog32 programming environment, by double-clicking on the **MacProlog32** icon. It may take a while to load the environment as this is a large system. The cursor changes to a set of binary numbers while the system is being loaded.

After **MacProlog32** has loaded, a window is displayed at the bottom of the screen. This is the $\sum$ Output Window where answers to Prolog queries and evaluations will normally appear. This window can be edited as any other window in the environment.

# 5 Loading a Prolog program

To load a Prolog program from disk, choose the **Open** option from the **File** menu. A standard Macintosh load dialog will be displayed. Select the file containing the program from the dialog box (a box containing a message requesting more information from you) by clicking on its name and making it highlighted. If your source file is not among one of the files displayed in the dialog box, click the **Desktop** button to select another disk until the file is found. Load the selected file by clicking the **Open** button. The program will be compiled automatically when it is loaded.

Note that every window is associated with a particular file. You can load several files into memory provided that the window names are not repeated.

# 6 Writing a Prolog program

To write a new program or add clauses into an existing one, type the source text into a program edit window and compile it. The edit window can be obtained by selecting **New** from the **File** menu at the top of the screen. The program is compiled by selecting the **Compile** option from the **Eval** menu, also at the top of the screen. If there is more than one window on the screen and the required one is not active, it can be made active (indicated by the highlighted title bar) by clicking the mouse button on the window concerned.

If a new program window is required for an opened file, select the **Work files** option from the **File** menu; a sub-menu is shown on the right - slide the mouse and select the **Add new window...** option. A single dialog box allows you to name the new window and associate it to an existing opened file (select the desired file and click the **Create** button).

To destroy a program window, select either **Close** from the **File** menu or **Kill window ...** in the **Work files** sub-menu.

Note that the default in MacProlog32 is for different clauses of the same relation to be defined in the same window. It is not required for such clauses to be defined consecutively, but it is more convenient for debugging purposes if they are kept together. Once you are more familiar with the environment you may alter this default to suit particular needs, but for the time being you are advised not to.

# 7 Compiling a program

To compile the front program window, select **Compile** from the **Eval** menu. A dialog will be displayed indicating the window is being compiled. The option **Compile all** will compile all program windows. The option **Check Syntax** will only check the syntax of the program and not do a compilation of the front window; a warning is given if an error is found.

## 8 Entering a Prolog Query

To run a query, select **Query ...** from the **Eval** menu to get the Query dialog. The **Enter a query** field is for you to enter your query and the **Solutions** field is used to return the instantiation values of the variables in the query. The pointer changes from an arrow cursor to an I-beam within the query field. If an existing query needs updating, position the I-beam at the place where the insertion is required and click the mouse. MacProlog32 remembers the last evaluated query, so that the command **Run last query** from the **Eval** menu can be used, avoiding retyping.

If the **All** button is clicked, all the solutions to the query, together with the original query, will appear in the **Solutions field**. The **First** option displays the first solution and the Query dialog changes to display this solution as well. Other solutions are found by clicking the **Next** button consecutively. The **Finish** button will terminate the querying process.

There are three check boxes in the Query dialog. The **Echo output** box enables the query to be echoed and the answers to be displayed in the $\sum$ Output Window. The **Compile** box determines whether re-compilation should take place before running a query; select it when you are, for instance, debugging a program so that re-compilation is automatically done before the query is executed. The **Hold dialog** box allows the Query dialog to remain open after the query finishes.

## 9 Interrupting the Execution of a Program

If your query has resulted in an infinite loop (yup, not everyone is a great programmer), you will need to stop the execution of the program. First of all, you need to interrupt the execution of the program by pressing the command key (bottom left corner of keyboard), and the full stop key - at the same time. A dialog will appear indicating that the program is now interrupted. You can then stop program execution by clicking the appropriate button in the dialog box.

## 10 Tracing a Prolog Query

Sometimes your program may not act like you expected (surprise surprise!!), and you would want to trace the execution of your query by means of the debugging facilities provided by MacProlog32. There are two debuggers: one is at the source level (and recommended for beginners - i.e. you) which shows the execution one step at a time, by highlighting the sub-query being evaluated and the assignment of variables within this evaluation; the other debugger is a linear trace of all the calls made during execution. This first one is the default option; to change it to the second one, run the query **prolog_flag( debug_file,_, boxbug)** (pretty obvious (NOT) hunh).

Regardless of the debugging mode chosen, the tracing facility is activated and deactivated by using the queries **debug** and **nodebug** respectively. Also, you need to indicate which relation(s) you want to trace by using the call **spy** followed by the relation name and its arity, hence for instance to trace a relation called *likes* that has 2 arguments, you have to evaluate the call **spy likes/2**. Once the debugging mode is switched on and there are spy point(s) set on some predicate(s), every time you execute a query involving one of the spied relations, a debug dialog will appear; you need to click on the **Creep** button to have one step of the execution, or click on **Skip** if you don't want to see the execution of a particular call. The debug dialog disappears when the evaluation terminates, or by clicking on the **Abort** button.

## 11 Saving a Program

To save a newly created or modified program, select one of the three options from the **File** menu. The **Save all** command saves all the current program windows to the associated files. The **Save** command saves the file to which the front window belongs; this takes effect only if the window is a program window. The **Save as...** command allows to save the file to which the front window belongs under a different name by means of a dialog window; the front window can be either text or program in this case.

**NOTE :** *It is advisable to save the program every so often after changes have been made to it. This is a safety measure to ensure that modified text will not be lost in case re-booting is necessary during the MacProlog32 session. It is also advisable to keep a second copy of your data disk in case of catastrophes.*

## 12 Program Window Manipulation

A MacProlog32 program window can be manipulated in exactly the same manner as a normal Macintosh window. To increase the size of a window, click on the size box in the bottom right corner of the window and drag it down to the right. To reduce the size of the window drag the size box to the left. The window size changes take effect when the mouse button is released.

To make the window zoom out to fill the screen, click on the zoom box which is on the right hand corner of the title bar. Clicking on the zoom box again will make the window return to its former size. To move a window, position the pointer anywhere on the title bar of the window and drag it to the new position by holding the mouse button down while moving the mouse.

While you can have many windows on your desktop at the same time, there can only be one active window (indicated by the highlighted title bar). A window can be made active by clicking anywhere within the window concerned. By clicking scroll arrows or dragging the scroll box along the scroll bar on the right side of the window, you can move what is displayed in the window. The position of the scroll box in the scroll bar indicates the position of the displayed text relative to the entire window. A window can be closed by clicking the close box on the left hand corner of the title bar.

## 13 Window Handling Facilities

The **Windows** menu of the MacProlog32 programming environment provides facilities for the user to handle program windows.

The **Create** command is used to create a new window of type display or graphics. A dialog appears asking you to enter the name of the window which must be different from the name of any other current window. A display window is used only for storage, its contents are not compiled or saved; graphic windows are more advanced and will not be covered here. Windows of the above type can be removed permanently by the **Kill** command.

The **Hide** option makes the front window invisible and has the same effect as clicking the window's close box on the left hand corner of the title bar. **Hide all** makes all the windows invisible while **Show all** brings them all back again.

The **Window details** and **Font...** command allow you to view and change the various characteristics of the front window.

The **Desktop** menu gives access to all the windows in the environment. The four types of windows specified in this menu **Program, Display, Control and Graphic** provide scrolling sub-menus that contain the list of windows corresponding to each type; a black diamond on the left of the window name indicates that the window is open (visible). Selecting a name from any such list brings the corresponding window to the front.

# 14 File Manipulation on a Macintosh

This section gives a brief description of the facilities available on the Macintosh to manipulate files (note that these are NOT available within the MacProlog32 environment).

Similar to directories in **Unix**, folders in Macintosh allow the creation of a hierarchy of system files, applications and documents. To create a new folder, choose the **New Folder** option from the **File** menu. A folder named *Empty Folder* appears in the active window. It can be renamed by typing over the name at the bottom of the folder.

To rename a document, folder, application or disk, select the icon concerned and type in the new name or use the **Edit** menu to edit the name. To copy an item to the same disk, select the item icon and choose the **Duplicate** option from the **File** menu. A copy of the selected item is created and this can then be renamed. An item can also be copied to a different disk. This can be done by dragging the icon concerned to the place where you want the copy to be placed.

If you are moving an item rather than copying it, you may want to remove the original item after copying it. To remove an item, drag the item icon into the **Wastebasket** window (if it is open) or the **Wastebasket** icon so that it becomes highlighted. To reclaim space immediately, choose the **Empty Wastebasket** option from the **Special** menu. A removed item can be recovered as long as its icon is visible in the **Wastebasket** window. First, open the **Wastebasket** window and find the icon for the item you want to recover. Then drag it out of the window onto the desktop or into another window.

A document or application can be locked to prevent it from being renamed or discarded. This can be done by selecting the icon from the item concerned, choose the **Get Info** option from the **File** menu, and click the **Locked** box in the dialog. A cross will appear in the **Locked** box indicating that the document or application has been locked. To unlock, perform the same operation and toggle the box.

# 15 References

1. *MacProlog Documentation* : Logic Programming Associates Ltd.
2. Web references : *http://www.cs.cf.ac.uk/User/O.F.Rana/prologpage.html*