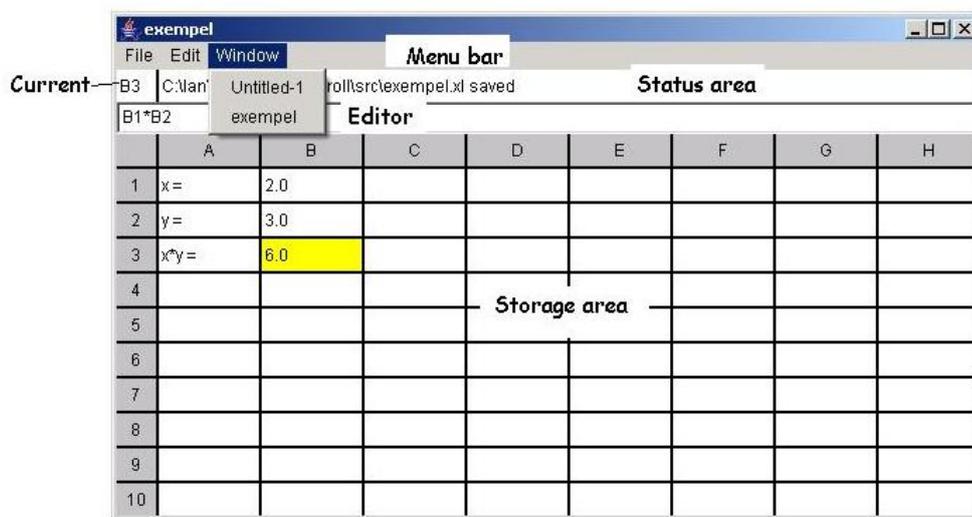


# The XL Reference Manual, Revision 6

## Introduction

The XL<sup>1</sup> spread sheet program provides a scratch pad for problems involving arithmetic. The program maintains five different areas on the screen: the menu bar, the current slot indicator, the status field, the editor, and the sheet area. The menu bar has two pull down menus. The current slot indicator and the status field are located just below the menu bar. They are used for displaying information and error messages about the spread sheet.

The editor is located at the following line and provides a simple line editor that can be used for entering data into the sheet area. The sheet area occupies the remainder of the frame window. It will show the contents of the spread sheet, as it is interactively changed through the editor and the menus.



## The sheet area

The sheet area is a matrix of slots, with columns ranging from A to H and rows from 1 to 10. The left border of the sheet area shows the line numbers and the top border shows the column letters. Each slot can store an expression or a comment. If a slot contains an expression the computed value of that expression is displayed. If it contains a comment the text is displayed. Each slot has an address constructed by the column and row indices. The address of the first slot is *A1* or equivalently *a1*. The last slot is named *H10* or *h10*.

The user may construct expressions over slots and thereby produce new values from those already present in the sheet area. The main purpose of the spread sheet program is to relate the positions of the numbers rather than the actual numbers. An example: If the numbers 2 and 3 are entered into the *b1* and *b2* and the expression *b1\*b2* is entered into *b3* then the value displayed in *b3* will be 6. Since the program stores the relations between the slots it is possible to change the value of *b1* or *b2*, forcing that also the value of *b3* is changed to remain the product of the values in *b1* and *b2*.

Each slot can be of three kinds: *blank*, *expression* or *comment*. A blank slot has no value. A comment is a string.

The value of an expression slot is a floating point number. An expression is built of constants, slot addresses, additions, subtractions, multiplications, and divisions. Parentheses may be used to change the

<sup>1</sup>This programming exercise is adapted from "Liskov, Guttag: Abstraction and Specification in Program Development".

order of computation in the usual way. These expressions are entered by the user and may be changed at any time.

An expression slot must not refer to an empty slot. A comment slot will return the value 0. An expression slot must not refer to it self directly nor indirectly. E.g. you must not store the expression  $a1+1$  in slot **a1** and you must not store the expression  $b2$  in slot **b1** and the expression  $b1$  in slot **b2**. In such cases the program will report an error in the status area and leave the contents of the sheet unchanged.

It is not possible to enter an expression so that a division by 0 occurs anywhere in the sheet area.

There is always one slot in the sheet area that is considered to be the *current slot*. This slot is marked with a background color and its address is displayed in the current slot indicator. The initial current slot is **A1**. Clicking on another slot will make it current.

The contents of the current slot will be displayed in editor when a new current slot is selected. If the slot contains an expression then this expression is displayed without unnecessary parentheses.

## The editor

The editor is used to enter an expression or a comment into the current slot. Anything starting with a # character is considered to be a comment. The # character is not part of the comment and is not shown in the sheet area.

If the editor is not empty and the return key is pressed its contents is put into the current slot provided that no error occurs.

## The menu bar

The menu bar has three pull down menus. The **File** menu has five alternatives.

**New** Creates a new XL frame. The title of the frame is **Untitled-** followed by a running number. Each new frame has its own menu bar, current slot indicator etc.

**Print** A print dialog opens and the current spread sheet can be printed.

**Save** A file dialog opens and the contents of the current spread sheet may be saved.

**Open** A file dialog opens and the contents of the current contents may be replaced by the file contents.

**Close** The current XL window is closed and all information contained i the spread sheet is lost. Closing the the last window will terminate the program.

The **Edit** menu has two alternatives; one for making the current slot empty and one for clearing all slots. The **Window** menu shows a list of all open spread sheets. Selecting an item will bring the corresponding window to the front.

## The status area

This area is used for displaying error messages.

## Current slot indicator

At all times the current slot indicator displays the address of the current slot.