Getting Started with IC Design in Mentor Graphics

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1 Configuring Mentor

Before running Mentor, you should check that the following environment variables are defined as follows:

variable	value
MGC_HOME	/mentor/idea
MGC_LOCATION_MAP	/mentor.idea/etc/mgc/mgc_location_map
MGLS_LICENSE_FILE	1717@allen.cs.tcd.ie

These should have been setup automatically for you. You need to set the following environment variables yourself:

variable	value
MGC_TMPDIR	/tmp or or anywhere you have write access and space
MGC_WD	/users/ug/*username*/mgc

Here *username* should be replaced with your own username. Note that you are being requested to use a subdirectory called mgc of your main UNIX directory as the place were Mentor stores your work. This is to facilitate automatic coursework submission later on.

You can do this with `setenv` commands or similar, in your .login file:

```
setenv MGC_TMPDIR /tmp
setenv MGC_WD /users/ug/username/mgc
```

2 Running Mentor

2.1 Running IC Station

The application you will mainly be running is called *IC Station*.
This is started as follows:

1. Log onto a Sun Workstation, and set a Window Manager running.
2. From the Unix prompt, type `xterm &` to set a new x-term window running.

   You want to do this because Mentor Graphics writes a transcript of user activity into the window from which it was launched.
3. From the new x-term window, enter `ic`. If all is well, a new window called "IC Station"should open, after a short delay.
4. It is recommended that the IC Station window is maximised while working in it.

Possible errors that can arise include:

`ic` **not found** The ic application is not in your `$PATH`. Your `$PATH` should include the directory `/mentor/idea/bin`.

Licensing Problems You may be unable to "connect to license server" or otherwise unable to obtain a license. Contact `help@cs.tcd.ie` for assistance in this case.

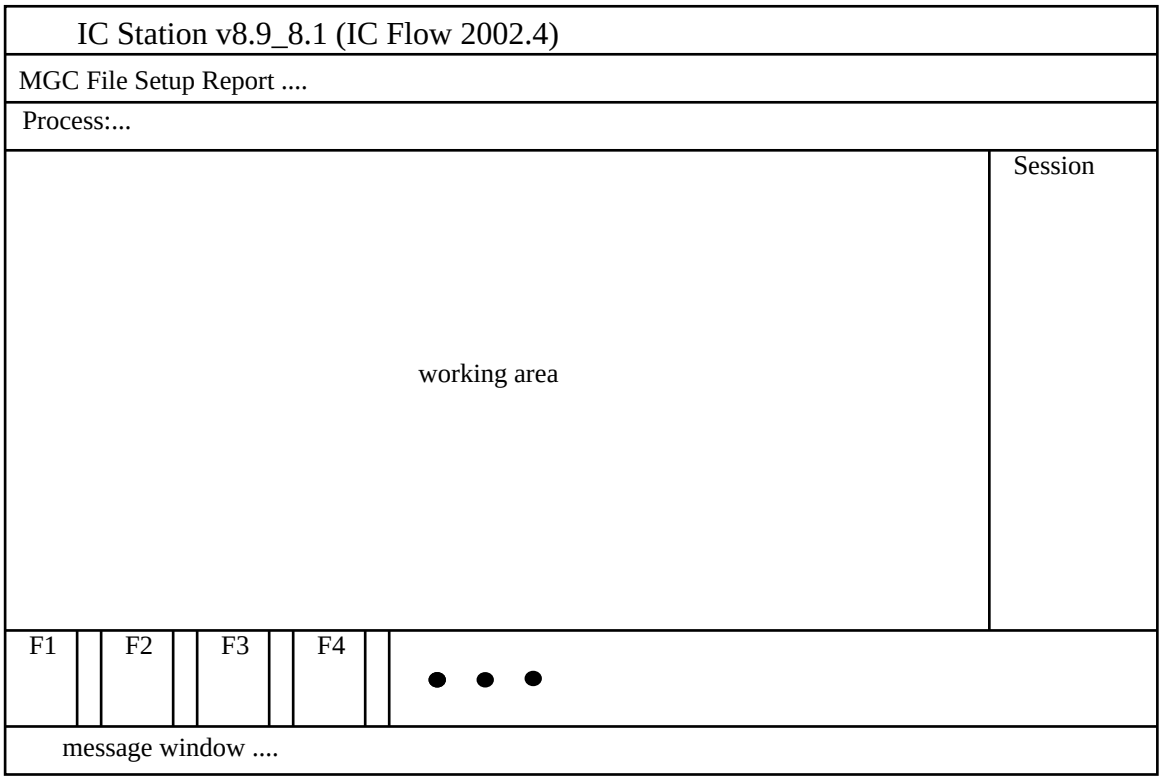
To exit from IC Station, you can use the Exit option under the MGC Menu.

2.2 Running Design Manager

To run the Design Manager utility, the unix command required is `dmgr_ic`. All other steps are the same as for running IC Station.

3 Using Mentor

When IC Station runs, the window looks like:



The "Session" palette to the right of the working area can be moved and resized to suit. Most other regions are fixed in pace.

Working sub-windows appear in the working area. These are typically associated with individual cells that are being edited or viewed.

3.1 Notation

We shall use the following notation as shorthands for parts of the display and user interface actions:

- $\mathcal{M}$: the top menu-bar.
- $\mathcal{W}$: the working area (and any windows opened in there).
- $\mathcal{P}$: the palette.
- $\mathcal{L}$: left mouse-button.
- $\mathcal{L}$: right mouse-button.

We indicate actions as per the following example:
$\mathcal{M}(\mathcal{L})$:**Help** > **Open Bookcase** > **IC Station Bookcase**
This means: go to the Menu, then use the Left button to select item **Open Bookcase** followed by **IC Station Bookcase**.

For the palette, we often indicate sub-sections after a period, so $\mathcal{P}$.Cell refers to the section of the palette entitled "Cell".

3.2 Getting Help

The Help menu is (usually) the rightmost one. This allows you to access the manual "bookcase", and in particular the one dealing with IC Station:
$\mathcal{M}(\mathcal{L})$:**Help** > **Open Bookcase** > **IC Station Bookcase**
This will open up Acrobat Reader and load up the relevant documentation. (You may need to repeat this action to get the document to load)

It is recommended that you select the "IC Station User's Manual", and the following parts of this are the most relevant:

- Chapter 9 : Design Management in IC Station
- Chapter 11 : Cell Related Operations
  — in particular the sections on "Saving A Cell" and "Saving A Cell Keeping the Edit Reservation".
- Chapter 12 : Full Custom Editing Operations

The Mentor documentation can also be accessed directly from `/mentor/idea/shared/pdfdocs/`, although it can be tricky to identify documents by their filenames.

3.2.1 Reporting Errors

If you get error messages that you don't understand, then email to
`Andrew.Butterfield@cs.tcd.ie`
with subject line starting
`3BA4 ic error :`
giving details of the problem, *and the last few lines of the transcript being generated by IC Station in the xterm window from which it was launched, at the point in time when the error occurred.*

3.3 Editing Cells

The main activity you will be doing is creating and editing layout "Cells". The following is a brief guide to doing this.

3.3.1 Edit Reservations

In order to edit a cell, it is not sufficient to simply have it open in a window in the working area. You must also "reserve" it for editing. Often, after saving, a cell will cease to be so reserved. In order to (re-)reserve a cell for editing do $\mathcal{M}(\mathcal{L})$:**File** > **Cell** > **Reserve** > **Current Context**.

3.3.2 Working Layers and Process

When entering shapes, the manufacturing layer (nDiff, Poly, Metal1, etc) associated with that shape is known as the "working layer". The available working layers and their appearance is determined by the "Process" information loaded with the Cell.

The process used for this course is
`/users/Public/BAICT/3BA4/CMOS-3BA4`

3.3.3 Shape Selection

When a shape is selected, it is usually highlighted in white. You can select shapes by left-clicking anywhere in the Cell window. If you mouse is not over a shape, then the nearest shape is selected. If you keep left-clicking, more and more shapes get selected — adding to what is called the *"selection set"*.

You can un-select all shapes by pressing F2.

You can also select shapes by left-dragging the mouse around them.

3.3.4 Command Modes

Many editing command require additional information which the request via (usually small) brown dialogue boxes, which usually appear near the bottom left of the screen. As it is possible to mix commands up, either deliberately, or inadvertently, it is useful to know how to escape from these dialogues — this is achieved by hitting the escape key (Esc) one or more times until all these dialogues have disappeared.

3.4 How to . . . ?

If you get stuck, try typing Escape (Esc) several times, followed by F2.

All clicks are left-clicks unless otherwise stated.

1. . . . create a new cell called "mycell":
   (a) Do ($\mathcal{P}$.Cell)$\mathcal{L}$:**Create**
   (b) In Cell Name enter `mycell`
   (c) In Process enter `/users/Public/BAICT/3BA4/CMOS-3BA4` (exactly as shown)
   (d) Close dialogue box by clicking Ok or hitting the Return key.

   For Cell Name and Process is it also possible to click on the button marked Navigator... and use the resulting dialogue box to select the desired object.

2. . . . select editing palette:
   Do ($\mathcal{P}$)$\mathcal{L}$:**Expert Edit**— the palette changes.
   Despite its name, the expert edit palette is the best one to use!

3. . . . select a "working layer":
   (a) Invoke layer change operation: ($\mathcal{P}$.Add)$\mathcal{L}$:LAY
   (b) Click on a layer name to select it.
   (c) Type Return or click OK.

   Note that you can change layer in the middle of some of the operations described below.

4. . . . add a rectangle/polygon on working layer:
   (a) Invoke add shape mode: ($\mathcal{P}$.ADD)$\mathcal{L}$:SH+. Note how this palette item changes to >SH.
   (b) Place pointer at one corner of rectangle/polygon, in the working area. Click, then move to the next point, and click again. Keep clicking until you have reached the last point, then double-click.
   (c) Continue making shapes (notice that the >SHstill stays). The working layer can be changed in between shapes. Note also that all the shapes add are added to the current selection set.
   (d) To exit from Add Shape mode: type Esc.

5. . . . unselect all shapes: type F2

6. . . . select a shape: click near shape edge — it will highlight when selected.

7. . . . delete a shape:

(a) Select it

(b) Do ($\mathcal{P}$.Edit)$\mathcal{L}$:DEL

8. ...move a shape:

(a) select it

(b) Do ($\mathcal{P}$.Edir)$\mathcal{L}$:MOV+(note change to >MOV)

(c) move to new position

(d) click to drop shape at new location

(e) type Esc to exit from moving mode

(f) type F2 to unselect moved items

9. ...exit the program: do ($\mathcal{M}$)$\mathcal{L}$:**File** > **Exit Session** > **Save**

If you get stuck, try typing Escape (Esc) several times, followed by F2.