

Schematic design with Design Architect by MENTOR

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ABSTRACT. Electrical and electronics engineers in our days use several software tools to enhance their work and to speed up the production flow of a device. In the following article is presented an overview about one of the most powerful tools in schematic and layout design. Mentor is very complex that's why the focus will be only to schematic design overview.

1 Introduction

In automotive industry several software tools are used to give the designer more freedom and more professionalism in development process. In former times the concept of a schematic was done on papers, in our days it is still used a paper, but in an electronically format.

Developing a product, any kind of product, is a real process in any industry and this process is marked in milestones and the flow is very well defined in time and space. Time is often the most critical issue, off course funds are with the same importance.

So, developing software tools for shorting time to minimum possible is not only an issue due to developing process but an issue of how workflow is more and more controlled.

This papers talks about one of the most complex tools used by engineers, this is *Design Architect inside Design Manager* by *Mentor Graphics*.

This tool is support under UNIX and Windows NT(emulation).

The logo for Mentor Graphics, featuring the word "Mentor" in a bold, sans-serif font above the word "Graphics" in a larger, bold, sans-serif font. A small registered trademark symbol (®) is located to the right of "Graphics".

2 Design Manager

The interface of Mentor Design Manager is the window where all the tools are: Design Architect, Board Architect, Layout, Fablink, so on. This window gives the designer access to all the tools for creating any electronically device from a to z.

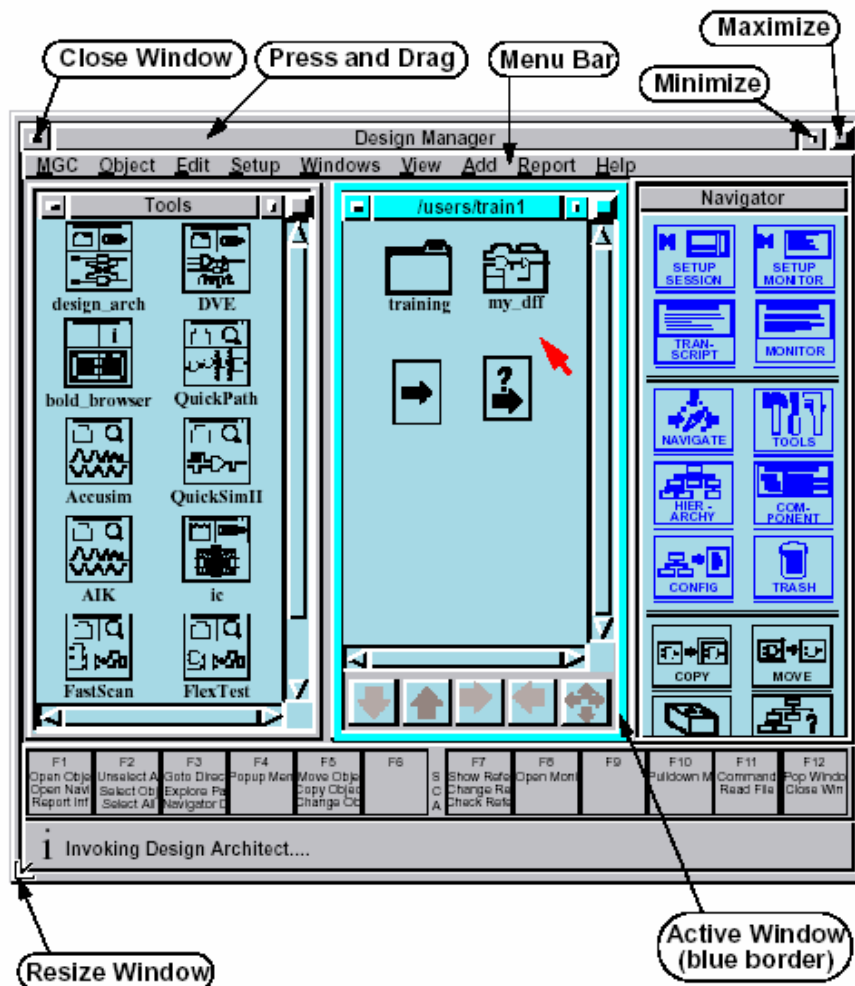


Figure 1. Design Manager interface

The file structure looks similar to Windows architecture, but it is not. A complete file ensemble or a design contains many files from which only the file that are available for modification to the designer are shown in

Design Manager. Several other configuration files are created together and this file are visible only under Windows systems.

File structure is different form Windows also from the nomenclature point of view:

- *containers* are Mentor design objects with more files, directories and objects inside and is associated with a *attribute-file*
- *folder* are same as subdirectories with folders, directories and objects

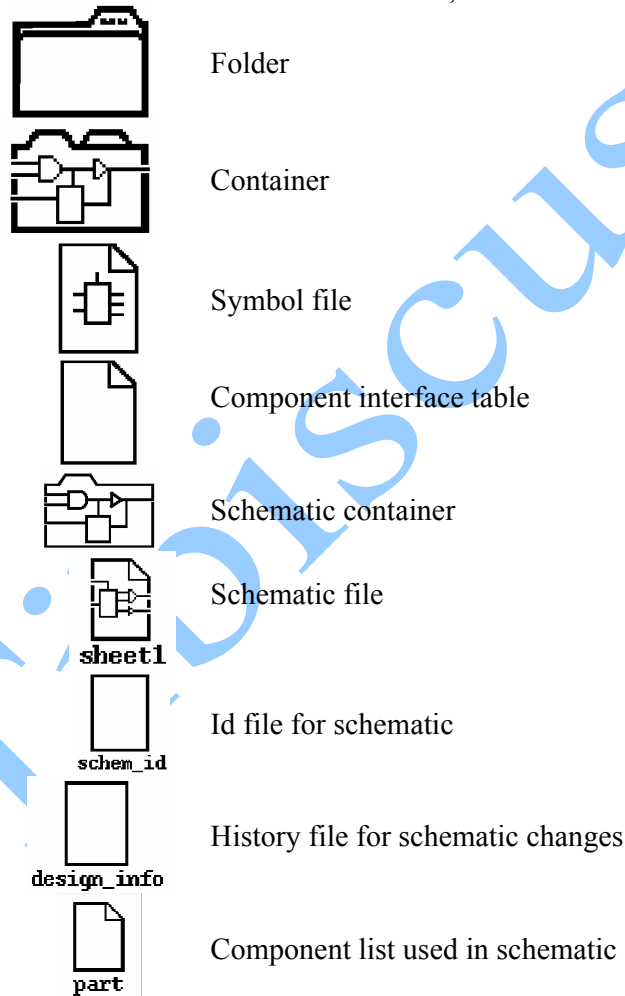


Figure 2. Files structure in Mentor for Design Architect

3 Design Architect architecture and flow

When the editor is used in Design Architect to enter a design, the tool creates the Electronic Design Data Model (EDDM), a set of design files and directories. The basic building blocks of your design consist of pre-built components, which reside in your file system libraries.

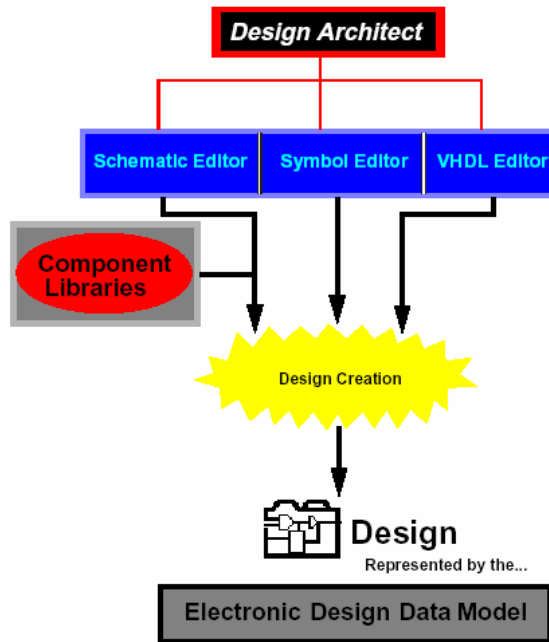


Figure 3. Schematic flow

The structure of a component used by schematic editor is a graphical model the *symbol body* overlaid over a functional model the *schematic body*. Components are similar to a sphere containing a collection of models, which represent a “chunk” of electronics.

Symbol body graphics, symbol pins, and properties compose a graphical model (symbol). More than one symbol may associate with a component.

Design Architect is similar to a toolbox containing a collection of graphic and text editor tools. You use these tools to create and modify the data you model in your design. The three primary tools in Design Architect are: Symbol Editor, Schematic Editor and VHDL Editor.

For the flow itself in the figure 1 is presented schematic design only, but just give an overview about the whole device creation flow figure 5 is more detailed.

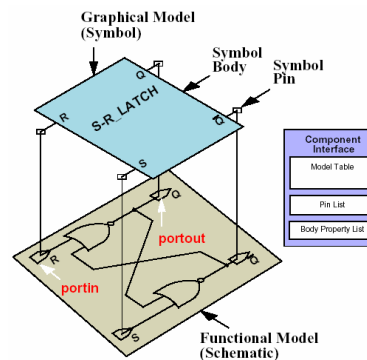


Figure 4. Component in Mentor

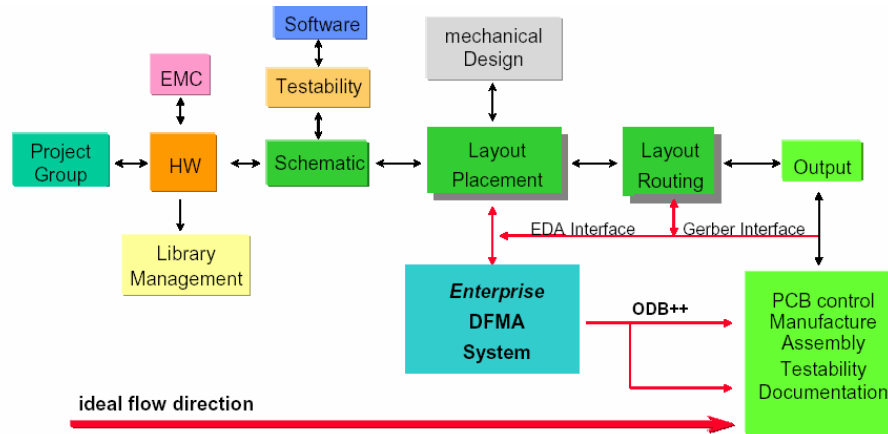


Figure 5. Device processing flow

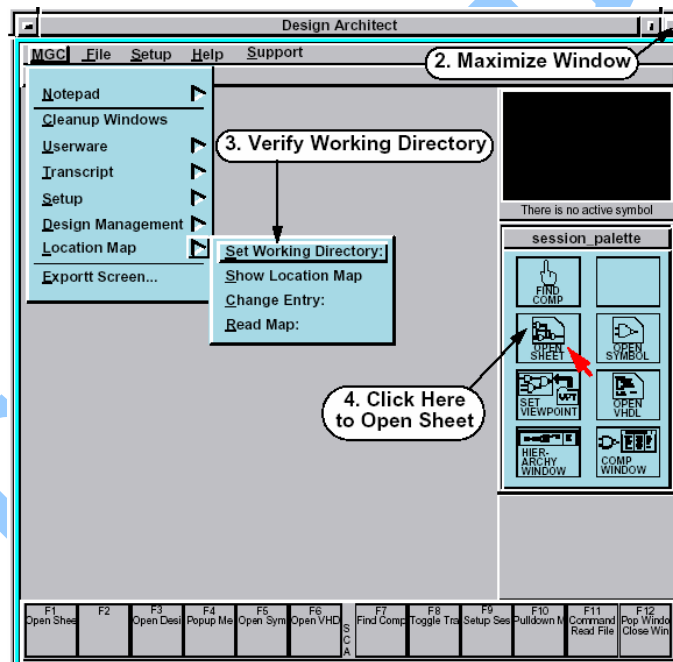


Figure 6. Design Architect working area

The interface of Design Architect is equipped with a complexity of menus and special strokes. It is very important to start a schematic design using some rules, in order to avoid errors.

For the aide of the developer there are several so called “sub-tools” or “user wares” or “macros” which will aid in schematic conception. These macros are hand created and sometimes they give the options to use additional features of Design Architect, which are not included in the menus.

One good example is the use of *multi-assy* property, which gives the possibility to add components on a layer style system. The layers are the variants of the schematics. In automotive industry the variants are a common thing, cars are equipped with functionalities, which the client can buy or can refuse to have.

A txt file is created and in it the following line is implemented:

```
($change_variant_display(@show,[["multi_assy","all"]],@true,@true) )
```

or as result:

```
R307A;0009.151.016;0805_075;1;100K;all,v01,v02,v09,v10;analog_input_ ANALOG_1;
```

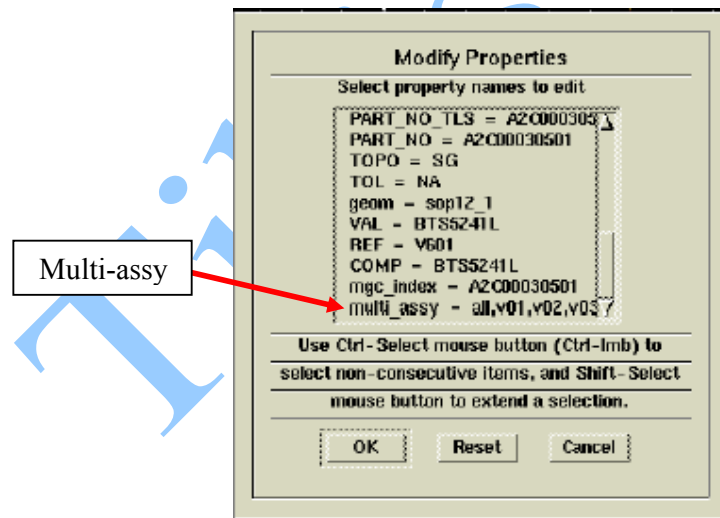


Figure 7. Properties for a components with variants

4 Design Architect strokes

Mentor Design Architect provides a series of “fast” commands named strokes. These commands are activated with the mouse middle button and are just simple drawings on the screen.

For example if one wishes to unselect all items selected, then a simple drawing like in figure 7 with the middle mouse button pushed will activate “Unselect All” command from the menu.

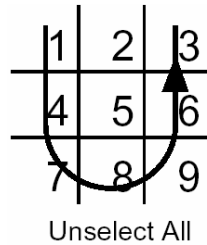


Figure 8. Matrix for strokes recognitions

Some predefined strokes are showed in the figure bellow. There are very handy and give the designer the opportunity to be faster in his design flow.

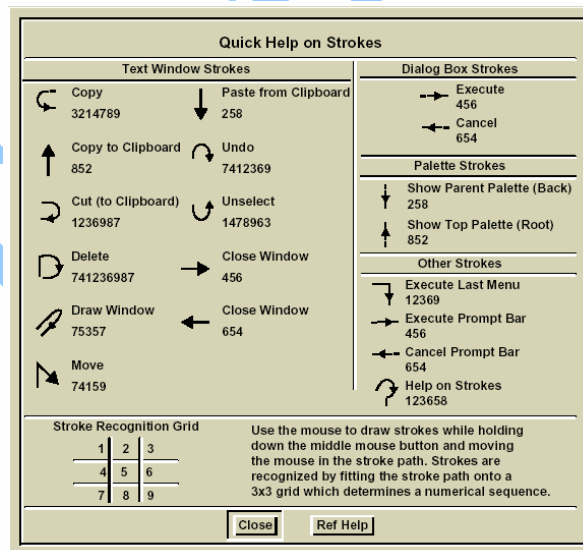


Figure 9. Help for strokes

5 Summary for Design Architect

- 1) When opening a schematic, one can open a new not created schematic and one can add multiple sheets;
- 2) Components must be used from a single library in order to avoid broken references;
- 3) Use of strokes aid the developer in schematic design and time saving;
- 4) Possibility of creating user ware or macros in order to enhance the menus and add more commands additional to the menus;
- 5) Design architect exports and imports many file to different other mathematical, CAD tools.

References

- [Oer04] **Steffen Oerterl** – *Mentor Schematic training*, Siemens VDO Automotive, 2004
- [***02] *** - *Getting Started with Design Architect*, Mentor Graphics Corporation, 2002.