Exercise 7:
Advanced Layout Stuff

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SOME MORE TOOL HINTS

Reminders

- When *gravity mode* is on, the cursor snaps to various shapes.
  - Toggle gravity mode with 'g' (Options → Editor...)
  - Better turn it off...

- Toggle between *full* and *partial selection* mode with F4

- Snap mode:
  - Normal is '*orthogonal*': edges can be only in x- or y directions
  - To change, invoke the options menu with F3 when drawing or moving

- Snap grid
  - Change snap grid spacing in editor options ('e')
  - Use as coarse grid as possible. Min = 0.01 µm (in this techno.)

- **Shapes are**
  - Paths ('p')
  - Rectangles ('r')
  - Polygons ('Shift-P')

- **To create a contact or via, use Create → Vias ('o')**
  - Select the layer pair you need
    - it contains shapes on 3 layers automatically

  - You can also create larger arrays
  - In 'stack' mode, you can connect across several layers (for instance M1 → M4)

- Changing the snap grid is required often.

- You can define your own bind key for this:
  - Add the following (skill) code to the **`.cdsinit`** file

```
procedure( setSnapGrid(snap)
  window = hiGetCurrentWindow()
  window~>xSnapSpacing = snap
  window~>ySnapSpacing = snap
  printf("Set Snap Spacing to %.3f\n" snap)  ; in CIW
)
hiSetBindKey("Layout" "1" "setSnapGrid(0.01)")
hiSetBindKey("Layout" "2" "setSnapGrid(0.1) ")
```

- Some keys should already be defined by the default
  - Check this! Check the Message in the CIW
  - Try the bind keys

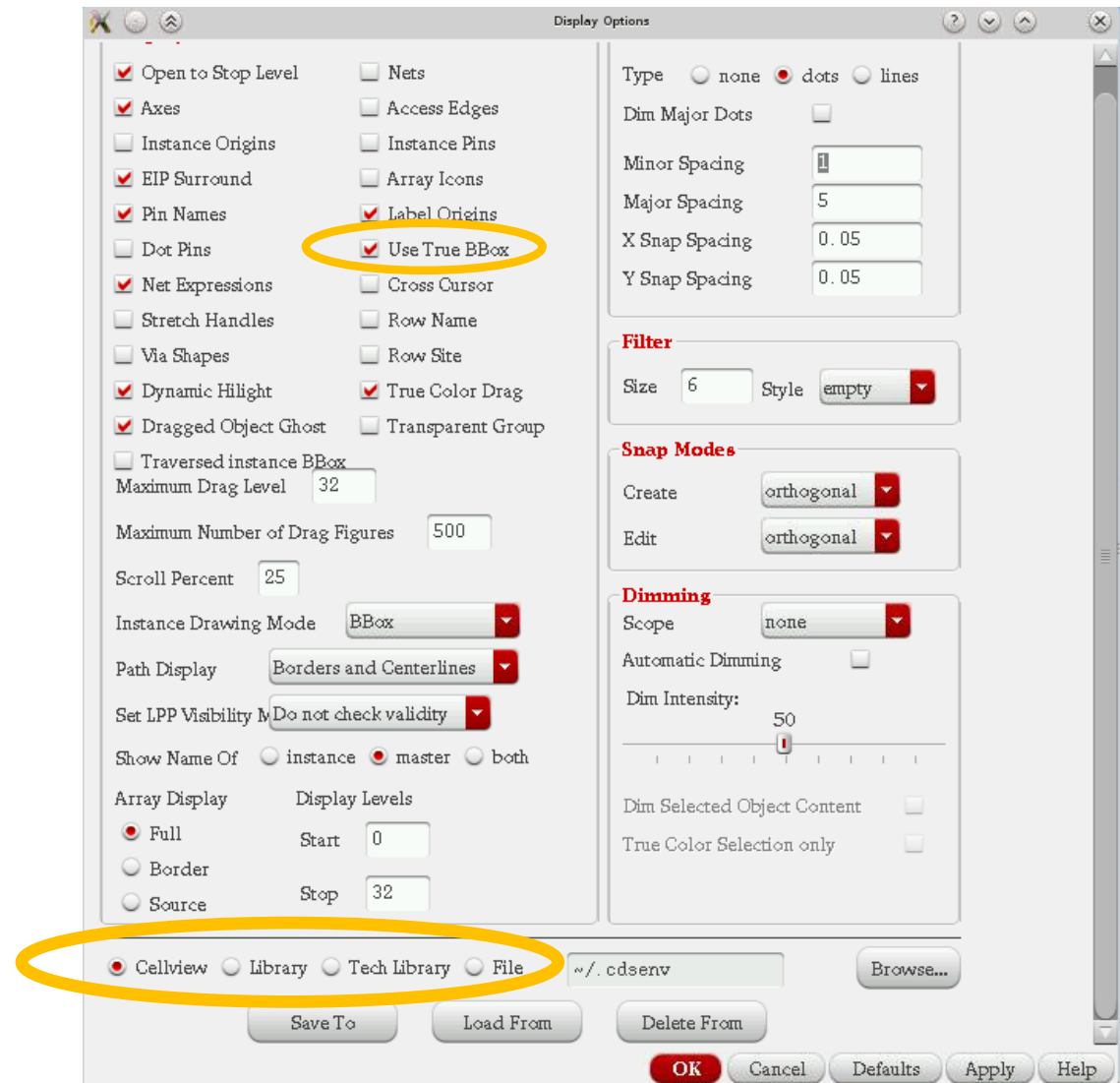- Other bind keys can be defined analogously

Saving Preferences

- **Editor setting can be saved**
  - To view
  - To whole library
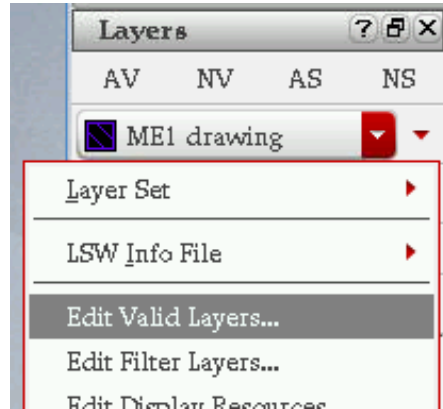
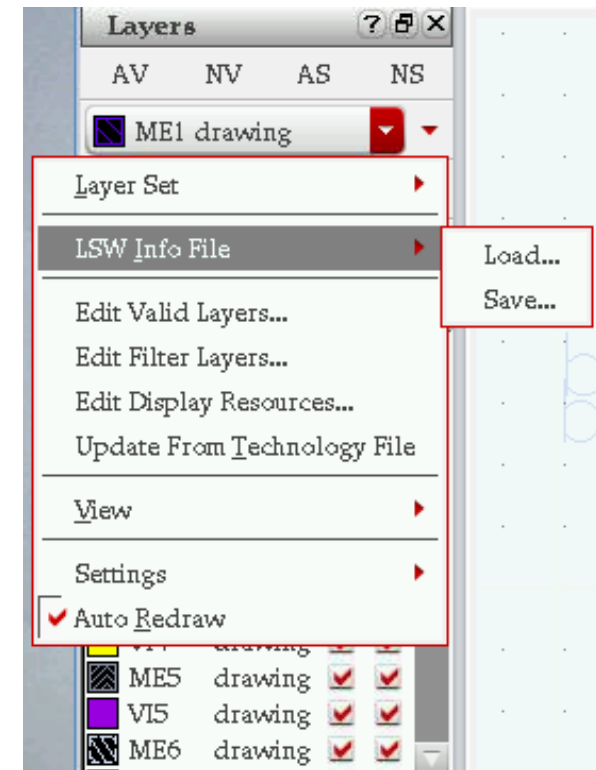- **For instance**
  - Grid
  - Dots
  - Axes
  - ...

Layer Map Saving
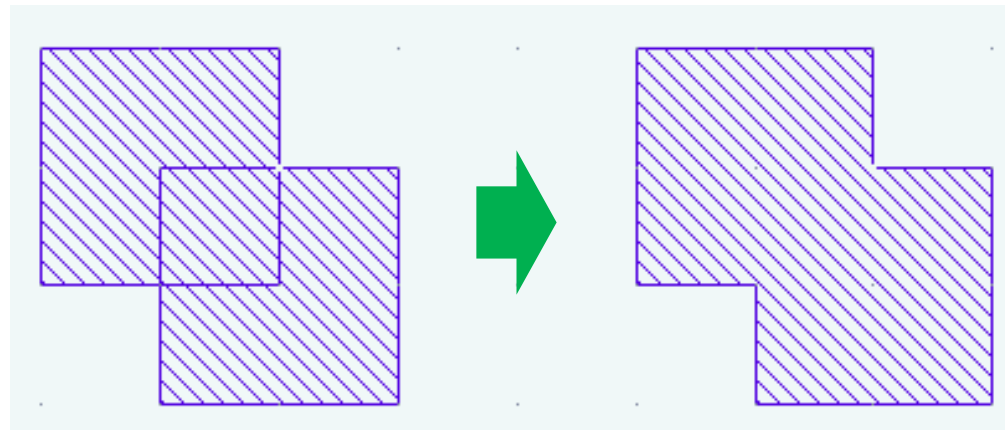
- You can chose which layers you see in the LSW using

- The layers selection in your LSW can be saved to a LSW info file
  - This is very useful

- **Shapes can be combined (merged):**
  - Select the shapes you want to merge
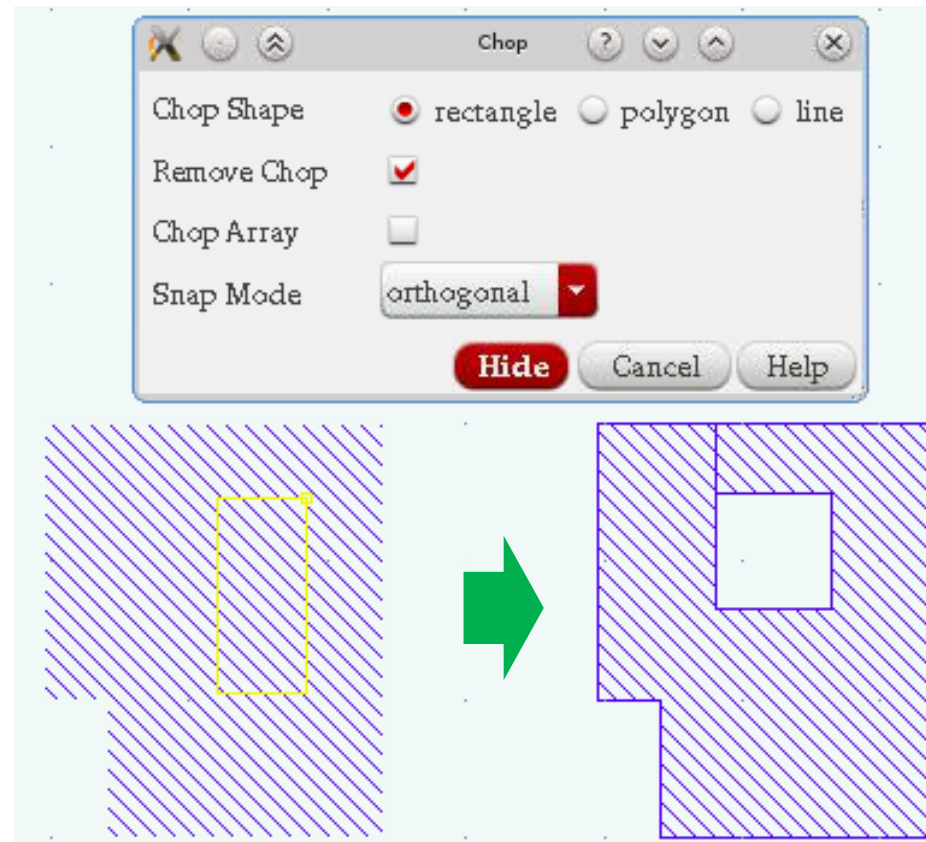 - Select Edit → Basic → Merge ('Shift-M')

  - Simplifies layout (less visible edges)

- **You can convert a Path to a Polygon**
  - use Edit → Convert → ToPolygon
  - Required e.g. when you want to change width to one side

- **You can cut shapes or remove parts of shapes**
  - Select the shape you want to chop
  - use Edit → Basic → Chop ('Shift-C')
  - Menu F3 allow to chop with rectangles or arbitrary shapes

Travelling the Hierarchy

- You can move down into the hierarchy by
  - Selecting the instance you want to edit
  - Select Edit → Hierarchy → Descend Edit ('Shift-X')

- To return back one level
  - Select Edit → Hierarchy → Return ('Shift-B')

- You can also leave display level unchanged, but edit a cell in a deeper hierarchy level using
  - Select Edit → Hierarchy → Edit in Place ('x')
  - Note that the title of the window displays the cell which you edit
  - Changes are immediately visible in *all* instances of the cell
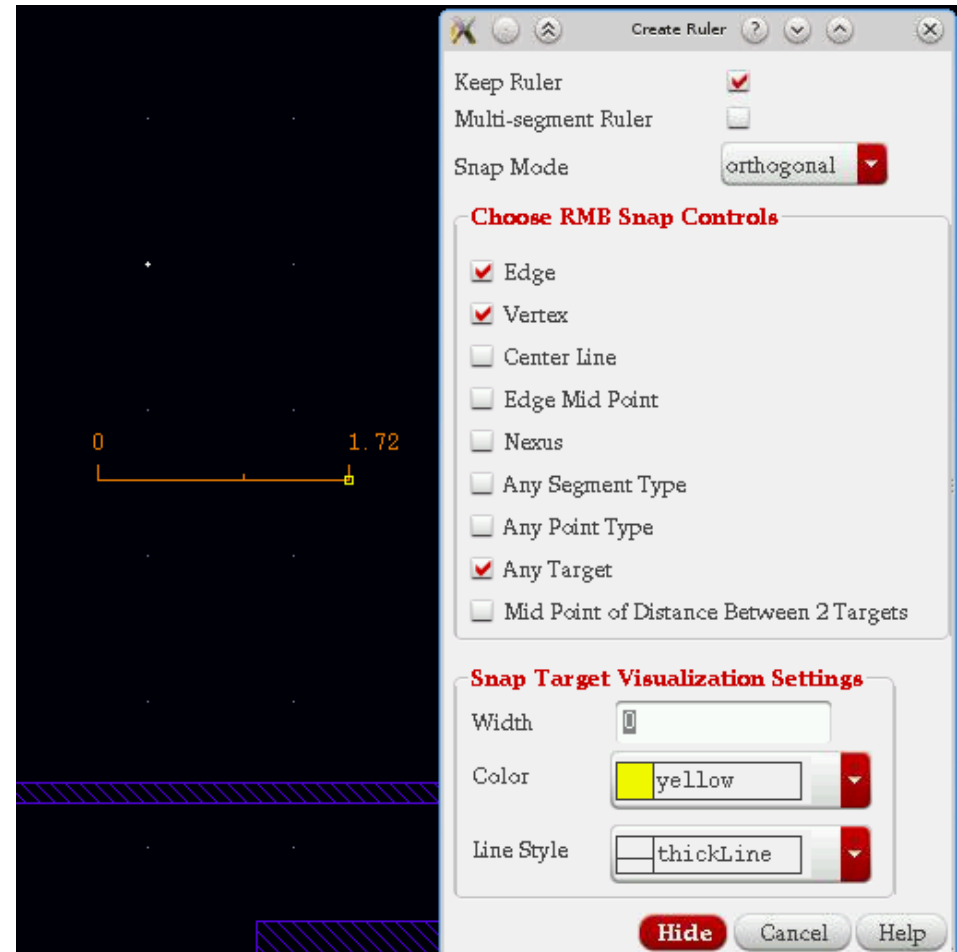- This is a very *powerful but dangerous* command!

- You can move the content of an instance into the layout which contains the cell by *flattening* the instance
  - Chose Edit → Hierarchy → Flatten
  - Make sure you check the button if you want to flatten a PCELL (parametrized cell, for instance MOS transistor)

- On the other hand, you can create a new cell from shapes in a layout:
  - Select the cells you want to put into the new cell
  - Chose Edit → Hierarchy → Make Cell
  - Give the cell a new name
  - Most of the time, you want to replace the shapes by the new cell.
  - You can set the origin of the cell directly.
- This is a very useful advanced command!

- The ruler can be displayed with Tools → Create Ruler ('k')
- Invoke the option menu with F3 (sometimes twice)
  - Better switch off all snap options
- Rulers are kept with the 'Keep Ruler' option

- Clear all rulers with 'Shift-K'

- Change Background Color:

- Before starting Cadence, type on shell:
  - echo "Opus.editorBackground: white" | xrdb –merge

- To go back to black, type
  - echo "Opus.editorBackground: black" | xrdb -merge