

SIEMENS EDA



How to Print Cell Hierarchy Path with Calibre DESIGNrev Scripting

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Outline



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Objective



This Support kit offers printing the cell hierarchy path and its bbox information, using a Calibre DESIGNrev Tcl script.

Included Files

File	Description
layout.gds	Sample GDS file
layout.gds.layerprops	Layer properties file
cell_list.txt	Text file includes a list of cell names
script.tcl	Tcl script to return the cell hierarchy path in a text file
runme	Script to Calibre DESIGNrev with Tcl code

Description

- Calibre DESIGNrev provides a convenient way to return reference cell information by using the command **\$L iterator ref**. The returned information is in the following format:
`{cell_name x y mirror angle mag [{properties}]} path {bbox}`
- **\$L iterator ref** takes 4 required arguments specifying the **cell name** that contains the objects to be returned and the **range** of elements to return with indices **startRange** through **endRange**
- The command also has multiple optional arguments such as:
 - **-depth startDepth endDepth**: specifying the hierarchical output of objects between startDepth and endDepth with the search beginning in the specified cell (the required cell name option).
 - **-filterCell list_of_cells**: used to return only objects that reference the specified list_of_cells.

Description

>> Tcl Script

- The Tcl script is invoked by a Calibre DESIGNrev batch run as such:

```
calibredrv script.tcl <layout_name> <cell_list.txt>
```

- It takes two required arguments for the input:
 - **layout_name:** the first argument is the layout file name
 - **cell_list.txt:** the second argument is the text file that contains specified cell names
- The script generates an output text file “cell_list.txt_out.txt”. That file contains the following:
 - The total instance reference count for the specified cell
 - The possible hierarchical path for each reported instance
 - The origin of each reported instance
 - the bbox information for each reported instance

Note:

- **The bbox (bounding box)** information are as follows: The first two values are the lower left corner coordinates, and the last two values are the upper right corner coordinates of the bounding box

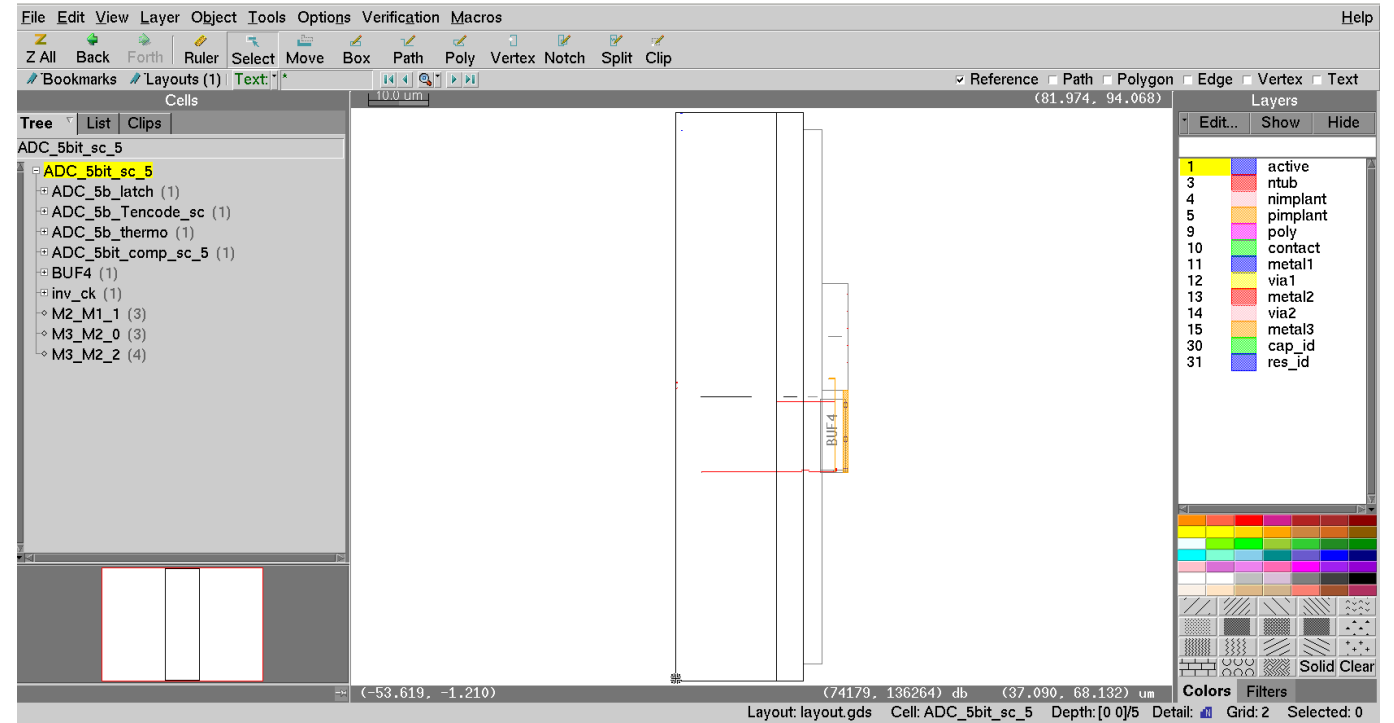
Description

>> Layout.gds

- View the sample layout with the command

`calibredrv layout.gds`

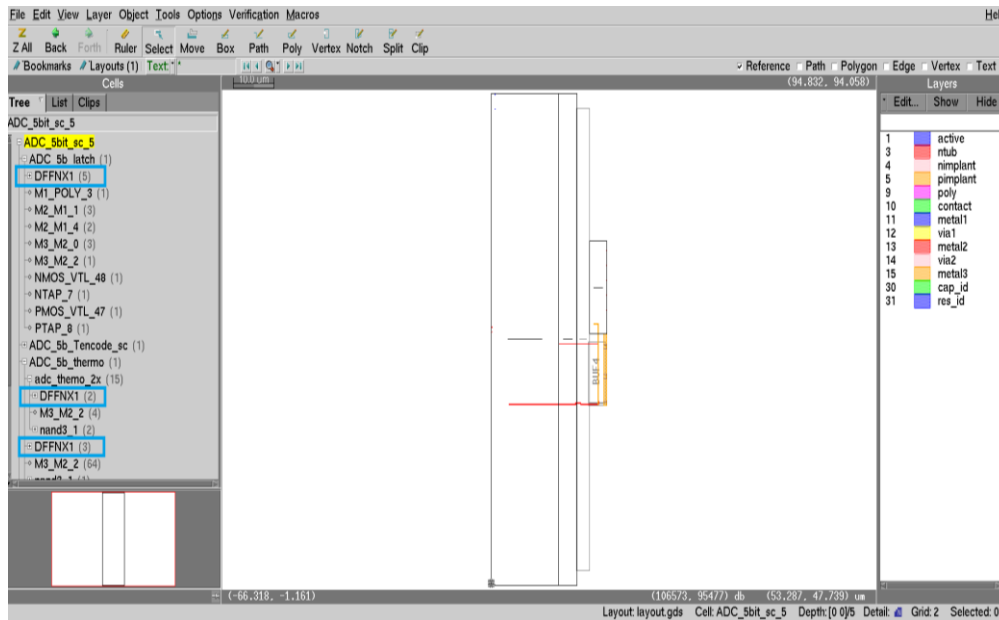
- To view all the hierarchy, press 9



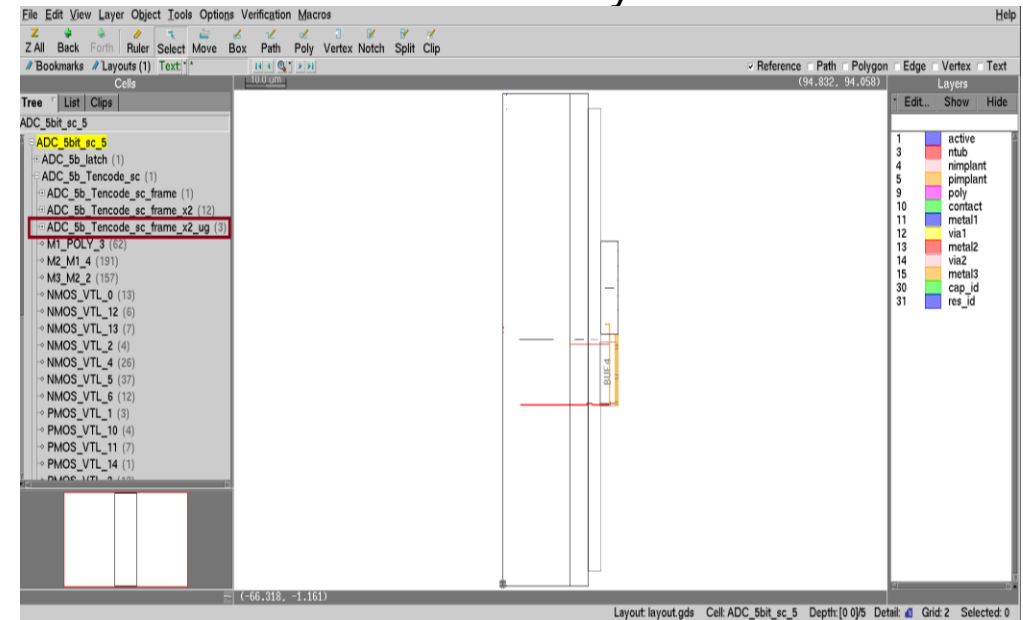
Description

>> Layout.gds

- In the cells tree, expand the following cells:
 - “ADC_5b_latch”
 - “ADC_5b_thermo”
 - “adc_themo_2x”
- You can observe that cell “**DFFNX1**” is referenced 38 times in the layout file.



- In the cells tree, expand the following cell:
 - ADC_5b_Tencode_sc
- You can observe that cell “**ADC_5b_Tencode_sc_frame_x2_ug**” is referenced 3 times in the layout file.



- Please close Calibre DESIGNrev after examining the layout file

Description

>> runme

- The **runme** file executes one Calibre DESIGNrev run followed by an execution of a Tcl script at invocation

```
#!/bin/csh  
calibredrv script.tcl layout.gds cell_list.txt
```

- The **cell_list.txt** file lists the cells whose paths are required to be reported
- For this test case, the cells **DFFNX1** and **ADC_5b_Tencode_sc_frame_x2_ug** are specified

```
DFFNX1  
|ADC_5b_Tencode_sc_frame_x2_ug
```

Note:

- Clear any empty lines in the “cell_list.txt file” to avoid any run error

Directions

- To execute the **runme** file, write the following in the opened terminal:

```
source runme
```

- This run generates the output text file “cell_list.txt_out.txt”. it contains the cell instances information as mentioned in the transcript

```
# Cell instance info is written to file cell_list.txt_out.txt
```

- You can open the generated text file “**cell_list.txt_out.txt**” using any text editor tool

The output text file “cell_list.txt_out.txt”

```
#####
Output Format:
Cellname      Instance Count
Hierarchy path cell origin  bbox { X1, Y1, X2, Y2 }
(Note : Coordinates are in um)
#####

Cell =DFNX1      Count =38
Path 1 = ADC_5bit_sc_5/ADC_5b_latch      (X,Y) = (24.25,56.4)      bbox = { 24.25 56.025 27.725 59.595 }
Path 2 = ADC_5bit_sc_5/ADC_5b_latch      (X,Y) = (24.25,59.76)      bbox = { 24.25 50.385 27.725 53.955 }
Path 3 = ADC_5bit_sc_5/ADC_5b_latch      (X,Y) = (24.25,62.04)      bbox = { 24.25 61.665 27.725 65.235 }
Path 4 = ADC_5bit_sc_5/ADC_5b_latch      (X,Y) = (24.25,56.4)      bbox = { 24.25 53.205 27.725 56.775 }
Path 5 = ADC_5bit_sc_5/ADC_5b_latch      (X,Y) = (24.25,62.04)      bbox = { 24.25 58.845 27.725 62.415 }
Path 6 = ADC_5bit_sc_5/ADC_5b_thermo      (X,Y) = (16.70500000000002,0.0)      bbox = { 16.705000000000002 -0.375 20.18 3.195000000000003 }
Path 7 = ADC_5bit_sc_5/ADC_5b_thermo      (X,Y) = (16.70500000000002,90.24)      bbox = { 16.705000000000002 89.865 20.18 93.435 }
Path 8 = ADC_5bit_sc_5/ADC_5b_thermo      (X,Y) = (16.70500000000002,90.24)      bbox = { 16.705000000000002 87.045 20.18 90.615 }
Path 9 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,73.3200000000001)      bbox = { 16.705000000000002 72.9450000000001 20.18 76.515 }
Path 10 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,73.3200000000001)      bbox = { 16.705000000000002 70.125 20.18 73.6950000000001 }
Path 11 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,78.9600000000001)      bbox = { 16.705000000000002 78.5850000000001 20.18 82.155 }
Path 12 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,78.9600000000001)      bbox = { 16.705000000000002 75.765 20.18 79.3350000000001 }
Path 13 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,62.04)      bbox = { 16.705000000000002 61.665 20.18 65.235 }
Path 14 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,62.04)      bbox = { 16.705000000000002 58.845 20.18 62.415 }
Path 15 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,67.68)      bbox = { 16.705000000000002 67.305 20.18 70.875 }
Path 16 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,67.68)      bbox = { 16.705000000000002 64.485 20.18 68.055 }
Path 17 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,50.76)      bbox = { 16.705000000000002 50.385 20.18 53.955 }
Path 18 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,50.76)      bbox = { 16.705000000000002 47.565 20.18 51.135 }
Path 19 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,56.4)      bbox = { 16.705000000000002 56.025 20.18 59.595 }
Path 20 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,56.4)      bbox = { 16.705000000000002 53.205 20.18 56.775 }
Path 21 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,45.12)      bbox = { 16.705000000000002 44.745 20.18 48.315 }
Path 22 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,45.12)      bbox = { 16.705000000000002 41.92500000000004 20.18 45.495 }
Path 23 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,39.4800000000004)      bbox = { 16.705000000000002 39.10500000000004 20.18 42.67500000000004 }
Path 24 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,39.4800000000004)      bbox = { 16.705000000000002 36.28500000000004 20.18 39.85500000000004 }
Path 25 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,28.2)      bbox = { 16.705000000000002 27.825 20.18 31.395 }
Path 26 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,28.2)      bbox = { 16.705000000000002 25.005 20.18 28.575 }
Path 27 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,33.84)      bbox = { 16.705000000000002 33.465 20.18 37.03500000000004 }
Path 28 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,33.84)      bbox = { 16.705000000000002 30.645 20.18 34.215 }
Path 29 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,16.92)      bbox = { 16.705000000000002 16.545 20.18 20.11500000000002 }
Path 30 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,16.92)      bbox = { 16.705000000000002 13.725 20.18 17.295 }
Path 31 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,22.56)      bbox = { 16.705000000000002 22.185 20.18 25.755 }
Path 32 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,22.56)      bbox = { 16.705000000000002 19.36500000000002 20.18 22.935 }
Path 33 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,11.28)      bbox = { 16.705000000000002 10.905 20.18 14.475 }
Path 34 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,11.28)      bbox = { 16.705000000000002 8.085 20.18 11.655 }
Path 35 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,5.64)      bbox = { 16.705000000000002 5.265 20.18 8.835 }
Path 36 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,5.64)      bbox = { 16.705000000000002 2.445 20.18 6.01500000000001 }
Path 37 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,84.6000000000001)      bbox = { 16.705000000000002 84.2250000000001 20.18 87.795 }
Path 38 = ADC_5bit_sc_5/ADC_5b_thermo/adc_themo_2x      (X,Y) = (16.70500000000002,84.6000000000001)      bbox = { 16.705000000000002 81.405 20.18 84.9750000000001 }

Cell =ADC_5b_Tencode_sc_frame_x2_ug      Count =3
Path 1 = ADC_5bit_sc_5/ADC_5b_Tencode_sc      (X,Y) = (21.0425,36.66000000000004)      bbox = { 21.0425 36.28 24.25 42.68 }
Path 2 = ADC_5bit_sc_5/ADC_5b_Tencode_sc      (X,Y) = (21.0425,31.02)      bbox = { 21.0425 30.64 24.25 37.04 }
Path 3 = ADC_5bit_sc_5/ADC_5b_Tencode_sc      (X,Y) = (21.0425,42.30000000000004)      bbox = { 21.0425 41.92 24.25 48.32 }
```

38 instances of cell
“DFNX1”

3 instances of cell
“ADC_5b_Tencode_sc_frame_x2_ug”

Note:
• All dimensions are in microns

Conclusion



- Dealing with full-chip layouts requires a quick access to cell instances information such as the instance path or the bounding box information
- **\$L iterator ref** is a very powerful Calibre DESIGNrev command, with vast optional arguments, that returns a list of the specified type of references with several information about each reference such as instance path, coordinates of the cell origin, angle of rotation, mirroring information, geometrical properties and bbox information
- Please refer to the **Calibre® DESIGNrev™ Reference Manual** for additional information

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