Owen-Ethan_905452983_palatics_Lab1

Report for Lab1
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Part 1: Import

Source the Setup File
`source lab1_setup`

Import the LEF file to create reference library
`lef2oa -lib NangateLib -lef NangateOpenCellLibrary.lef`

Import Verilog netlist to create the design library for NangateLib
`verilog2oa -lib DesignLib -refLibs NangateLib -view layout -viewType maskLayout -verilog s1196_postrouting.v`

Import the DEF file to add physical layout information
`def2oa -lib DesignLib -cell s1196_bench -view layout -def s1196_postrouting.def -refLibs NangateLib`

Part 2: Fanout

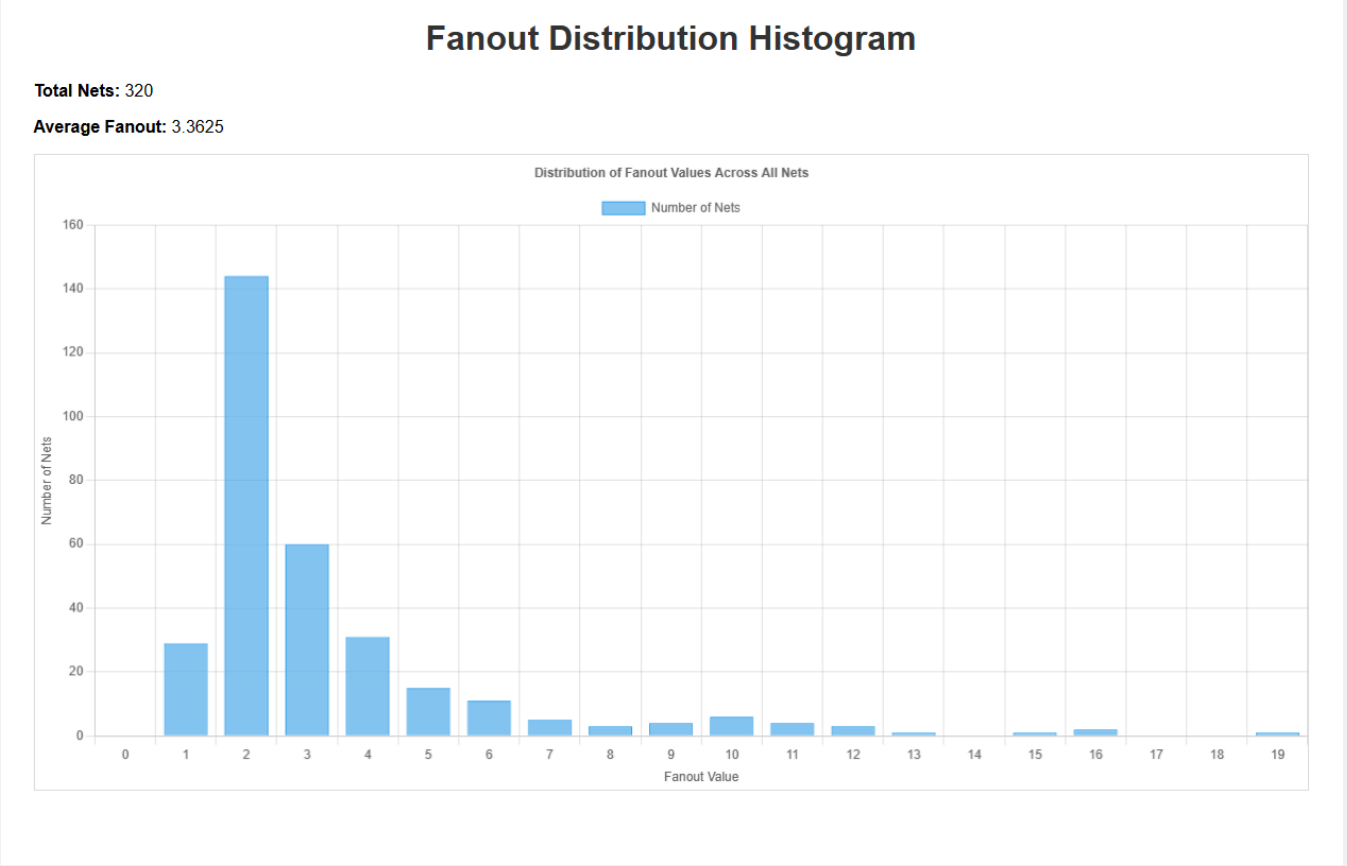
Assumptions here:

- Filtered out Power Nets: VDD, VSS (by name)
- Filtered out Ground Nets: VSS (by name)
- Filtered out Clock Nets: blif_clk_net (by name)
- Filtered out Reset Nets: blif_reset_net (by name)
- Filtered out Tie Nets: tie1, tie0 (by name)
- Fanout defined as sum of all connections on net, including oaInstTerms and oaTerms, but excluding output/inout terms.

Method

- Initialize fanout counter to 0 for each net
- For oaInstTerms:
  - Iterate through all instance terminals connected to the net
  - Increment fanout for each load
- For oaTerms:
  - Iterate through all primary terminals connected to the net
  - Get the terminal type for the term
  - Only count INPUT terminals as loads
  - Ignore output and inout terminals
- Calculate average fanout across all qualifying nets

Plot for Fanout Distribution



Part 3: HPWL (half-perimeter wire length)

Assumtions here:

- Filtered out Power Nets: VDD, VSS (by name)
- Filtered out Ground Nets: VSS (by name)
- Filtered out Clock Nets: blif_clk_net (by name)
- Filtered out Reset Nets: blif_reset_net (by name)
- Filtered out Tie Nets: tie1, tie0 (by name)
- Filtered out everything but 2-terminal nets (counting both oaInstTerm and oaTerm)
- Filtered out by Net name and by Net type
- Process all metal layers

Methodology:

- Initialize a bounding box to track the shape
- For oaTerms:
  - Traverse the path: oaTerm -> oaPin -> oaPinFig
  - Get bounding box of each oaPinFig
  - Expand the overall bounding box to encompass all pin figures
  - This includes all metal layers
- For oaInstTerms:
  - Get the instance's bounding box
  - Calculate the center point of the instance
  - Expand the bounding box to include this point
  - Uses centers as only approximations

- Track min and max X & Y values
- Compute the HPWL as $(maxX - minX) + (maxY - minY)$

Plot for HPWL Distribution

HPWL Distribution Histogram

Total Nets (2 ends): 158

Average HPWL: 9743.92

Min HPWL: 1140

Max HPWL: 50290