

Final Project

Part 1 Description:

Write a C++ program that implements the Minimum-area Floorplan (shape function) algorithm. The output is the **minimum floorplan area**, its **aspect ratio**, and percentage of wasted area (**core utilization**). As well, **state each block dimension**. The possible dimensions for each gate is given in table 1 where each gate can be flipped 90° (i.e: lengths and widths are interchangeable.)

Part 2 Description:

Write a C++ program that implements the Minimum-cut Placement algorithm using the implemented KL algorithm in the mini project. Given a small netlist, which consists of 8 logic gates, apply the minimum-cut placement such that the gates are placed in a 2×4 layout grid (2 rows and 4 columns). The initial cut should be found using initial partitioning with the KL algorithm and to be considered as a vertical cut. The cutline directions are to be alternating. The output should specify the final placement of the gates in the layout grid. The area of each gate is given in table 1.

Table 1. Gates dimensions with n as the number of inputs

| Component | NOT Gate | AND Gate | OR Gate | XOR Gate | Flipflop | NAND Gate | NOR Gate | XNOR Gate |
|------------|----------|---------------------|---------------------|----------------|----------|-----------|----------|-----------|
| Dimensions | $2 * 1$ | $(n + 1) * (n + 1)$ | $(n + 1) * (n + 1)$ | $2n * (n + 2)$ | $8 * 1$ | $n * n$ | $n * n$ | $2n * n$ |

Policies:

- Part 1 input netlist is of a format identical to *netlist.txt* attached.
- Part 2 input netlist is of a format identical to *netlist_small.txt* attached.
- The code must be general and accept any input.
- Your team should be the same team of the mini project. If you wish to work individually, please update that in this [sheet](#).
- Duplicate submissions are not accepted and will result in a zero grade for both the original and the duplicate.
- Plagiarism is not accepted. Any plagiarized content will result in a zero grade.
- Late submission is not allowed.