National Cheng Kung University
Graduate Institute of Electrical Engineering
VLSI/CAD Group

Oct. 07, 2017
Jai-Ming Lin
Physical Design for Nanometer IC, Fall 2017

Programming Assignment #2: FM program – [2-way Partition]

Let $C = \{c_1, c_2, c_3, \ldots, c_n\}$ be a set of n cells and $N = \{n_1, n_2, n_3, \ldots, n_m\}$ be a set of m nets. Each net n_i connects a subset of the cells in C. The 2-way partition problem is to partition n cells in set C into two disjoint groups, G_1 and G_2 such that the overall cut size is minimized. Note that no cell replication is allowed. The "***cut size***" s is given by "***the number of nets having cells on both G_1 and G_2***". We define the group size as the area of cells in the group. The partition constraint is that "**$|G_1|/(|G_1|+|G_2|) \approx \gamma$ where $|G_i|$ denote the size of G_i and γ is equal to 0.4**".

Input

- **.nodes file**

Sample Input

```
UCLA nodes 1.0
# Created      :     Jan   6 2005
# User         :     Gi-Joon Nam & Mehmet Yildiz at IBM Austin Research({gnam, mcan}@us.ibm.com)

NumNodes :          211447 → Total number of cells
NumTerminals :      543
    o0      8     12
    o1      13    12
    o2      13    12
    o3      13    12
    o4      13    12
    o5      13    12
    o6      13    12
    o7      13    12
    o8      13    12
    o9      13    12
    o211434 80    1020  terminal
    o211435 164   2136  terminal
    o211436 164   2136  terminal
    o211437 164   2136  terminal
    o211438 164   2136  terminal
```

Cell Name, The width of cell, The height of cell (Sequentially)

[Do NOT need to consider FIXED nodes]

FIXED nodes

- **.nets file**

Sample Input

UCLA nets 1.0

Created : Jan 6 2005

User : Gi-Joon Nam & Mehmet Yildiz at IBM Austin Research({gnam,mcan}@us.ibm.com)

NumNets : 221142 → **Total number of nets**

NumPins : 944053 → **Total number of pins**

NetDegree : 4 n0 → **Net n0 linking 4 cells**

o197239 I : -0.500000 -6.000000

o197110 O : -1.500000 -3.000000

o85644 I : -6.000000 -2.000000

o0 I : -3.000000 -5.000000

Cells linked by n0

Cell Name, Input/Output Pin, OffsetX, OffsetY (Sequentially)

[Only need Cell Name]

Output

The program output asks you to find out the cut size (***as small as possible***), the sizes of G_1 and G_2, and the cells in G_1 and G_2. The following table gives the output format. **Please follow the output format to generate output file.**

Sample Output

Cut_size: 4

G1_size: 3

G2_size: 3

Time: 0.000 s

G1:

o0 o1 o2;

G2:

o4 o5 o6;

Cut_set:

n1 n2 n3 n5;

Language/Platform

The program should be performed on the Linux machine.

Command Line Format

FM_StudentID <circuit.nodes> <circuit.nets> [circuit.out]

Example: ./FM_XXXXXXXXX adaptec1.nodes adaptec1.nets adaptec1.out

Note that you should write your own make file.

Evaluation Score

The released **five** benchmarks and **one hidden** benchmark will be used to evaluate score.