

Programming Assignment #1: FM program – [2-way Partition]

Let $C = \{c_1, c_2, c_3, \dots, c_n\}$ be a set of n cells and $N = \{n_1, n_2, n_3, \dots, n_m\}$ 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	[Do NOT need to consider FIXED nodes]
o211435	164	2136	terminal	
o211436	164	2136	terminal	
o211437	164	2136	terminal	
o211438	164	2136	terminal	

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	Cells linked by n0 Cell Name, Input/Output Pin, OffsetX, OffsetY (Sequentially) [Only need Cell Name]
o197110	O : -1.500000	-3.000000	
o85644	I : -6.000000	-2.000000	
o0	I : -3.000000	-5.000000	

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.

Compiler version: g++ 6.3.0

Command Line Format

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

Example: ./FM_XXXXXXXXXX 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.