CS6135 VLSI Physical Design Automation

Homework 2: Two-way Min-cut Partitioning

Due: 23:59, March 31, 2016

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1. Introduction

Let ***C*** be a set of cells and ***N*** be a set of nets. Each net connects a subset of cells. The two-way min-cut partitioning problem is to partition the cell set into two groups *A* and *B*. The cost of a two-way partitioning is measured by the cut size, which is the number of nets having cells in both groups.

2. Problem Description

For this homework you are asked to implement *FM ALGORITHM* to solve the problem of two-way min-cut partitioning. The problem is defined as follows:

- **Input:**

  A netlist for a circuit

  The size of each cell

- **Objective:** To partition the circuit in two sub-circuits *A* and *B*, so that the cut size is minimized under the constraint of $|area(A) - area(B)| < n/10$, where $area(A)$ is the sum of all cell sizes in *A*, $area(B)$ is the sum of all cell sizes in *B*, and *n* is the sum of all cell sizes in the circuit.

3. Input

- **The *.cells* file**

  This input file specifies a list of cells. Each cell statement starts with its cell name and the size of the cell.

- **The *.nets* file**

  This input file specifies a list of nets. Each net statement starts with the keyword “NET” and the name of the net. The cells that are connected by the net are listed between a pair of braces following the net name.

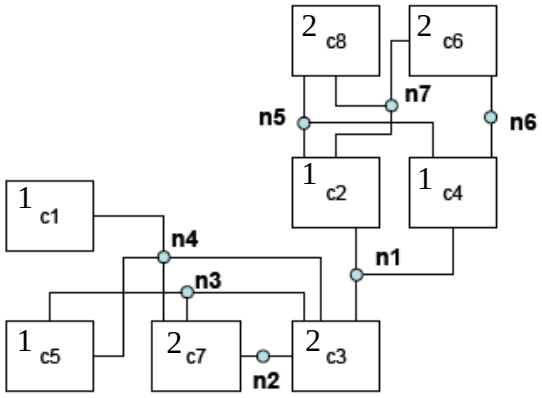
Example:

.cells

```
c2 1
c3 2
c4 1
c7 2
c5 1
c1 1
c8 2
c6 2
```

.nets

```
NET n1 { c2 c3 c4 }
NET n2 { c3 c7 }
NET n3 { c3 c5 c7 }
NET n4 { c1 c3 c5 c7 }
NET n5 { c2 c4 c8 }
NET n6 { c4 c6 }
NET n7 { c2 c6 c8 }
```

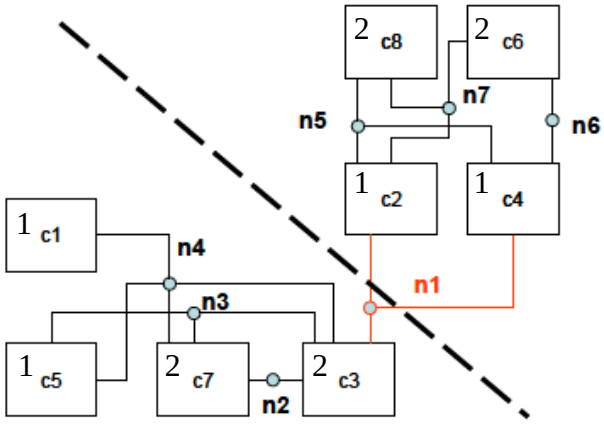


4. Output

Report the cells in each group and the cutsize. **Please follow the output format.**

Output Format:

```
cut_size #
A #Cell_in_groupA
cell_ID
…
B #Cell_in_groupB
cell_ID
…
…
```



Example:

```
cut_size 1
A 4
c1
c3
c5
c7
B 4
c2
c4
c6
c8
```

5. Language/Platform

- Language: C/C++
- Platform: Linux/Sun

6. Here are required files :

- **README:** In this file, you must report the results and runtimes for all test cases, and describe how to compile and run your program.
- **Source code file**
- **Binary file:** The executable file compiled on a Linux or Sun system.
- **Output files.**

Please compress all the required files (using tar or zip) into one with the name "CS6135 HW2_YourStudentID" before uploading to iLMS!

You can use the following command to compress your directory on a workstation:

```
tar -zcvf CS6135 HW2_YourStudentID.tar.gz directory
```

For example:

```
tar -zcvf CS6135 HW2_g9123456.tar.gz cs6135_hw2
```

7. Notice

- 此題的測試檔有些 net 會有兩個或兩個以上相同名稱的cell，你(妳)的程式中必須考慮此種情況。
- 不可使用目前已釋出的程式碼或tool，去完成這次的題目；但你(妳)可以拿現有的程式碼或tool(e.g., hMETIS)所跑出來的數據與你(妳)的程式碼執行出來的數據來判斷你(妳)的程式是否有改進的空間。
- cutsize與run time是評分的依據。

Please note that the due time is strictly followed.

No late submission will be accepted!