CAD Design Project 5 – Min-cut Circuit Bi-partitioning
Due: 23:55, Nov. 23, 2022

Circuit partitioning is an important technique to divide a design into manageable and smaller pieces for further processing. In this project, you are required to use the library of hMetis (libhmetis.a), a well-known academic hypergraph partitioning package, to perform min-cut circuit bi-partitioning. Your program partitions a circuit into two sub-circuits (*X* and *Y*) on Linux environment according to the following requirements:

1. The area of each node is defined as $Area_{node} = \#inputs + \#single\_output\_covers$.
2. The area ratios of sub-circuits *X* and *Y* are R_x and R_y, respectively,

   where $R_x = Area(X) / Area(X+Y)$, $R_y = Area(Y) / Area(X+Y)$,

   The ratios must be below a user-specified value *r*.

   (NOTE: *r* is larger than or equal to 0.5)
3. For simplicity, the hyperedge weight of a node output is defined as the number of fanout nodes. Hence, the cut size of a hyperedge is the number of sinks if all nodes belong to that edge are in different partitions; otherwise the cut size is 0.
4. Ignore the cut size and area of all primary inputs.
5. Upload your source code tarball (*.tgz) to moodle (including your Makefile).

   (NOTE: The uploaded file name should be the same with your student ID.)

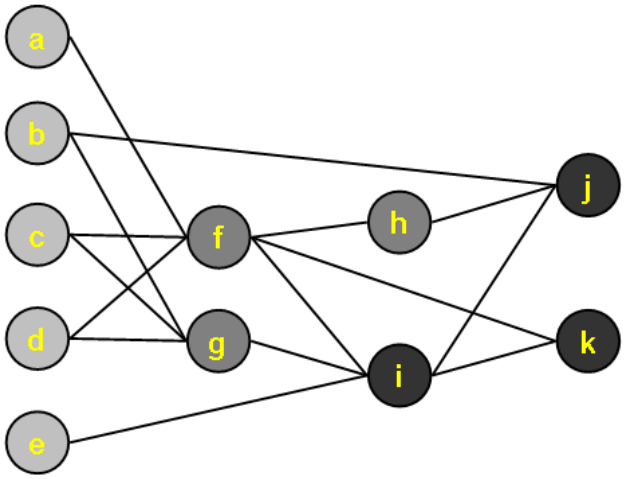
Reference:

[1] *hMETIS* - Hypergraph & Circuit Partitioning

URL: http://glaros.dtc.umn.edu/gkhome/metis/hmetis/overview

BLIF Example: sample.blif

```
.model sample.blif
.inputs a b c d e
.outputs i j k
.names a c d f
111 1
.names b c d g
001 1
010 1
011 1
100 1
110 1
.names f h
0 1
.names e f g i
111 1
.names b h i j
100 1
010 1
001 1
.names f i k
11 1
.end
```



SYNOPSIS

```
%> partition BLIF_FILE ratio
```

Run-time Example:

```
%> par sample01.blif 0.52
Partition X
Nodes: f g h
Area: 14
Ratio: 0.519
Partition Y
Nodes: i j k
Area: 13
Ratio: 0.481
Cut size: 5
END
```

The following figures are for your reference.