

Programming Assignment #1: Chip Floorplanning **(due 5pm, April 18, 2006 on-line)**

Modified from Problem #1 of the 2003 IC/CAD Contest (Source: Springsoft Inc.)

1. Problem Statement

This programming assignment asks you to write a chip floorplanner that can handle hard macros. Given a set of rectangular macros, the floorplanner places all macros within a rectangular chip without any overlaps. We assume that the lower-left corner of this chip is the origin (0,0) and no space (channel) is needed between two different macros. The objective is to minimize the area of chip bounding box.

2. Input/Output Specification

Input Format

Each testcase has one input file, *input.block*. It first gives the number of macros defined in this file, and followed by the name, width, and height information of each macro. The file format is as follows:

```
<# of macros>  
<macro name> <macro width> <macro height>  
... More macros
```

Output Format

The output file (*output.rpt*) records the problem output. This report consists of four parts: (1) chip area, (2) chip width and height, (3) runtime in seconds, and (4) bounding box for each macro (specified by lower-left corner and upper-right corner). The report file format is as follows:

```
<chip_area>  
// area = (chip_width) * (chip_height)  
<chip_width> <chip_height>  
//resulting chip width and height  
<program_runtime>  
//report the runtime in seconds  
<macro_name>    <x1>    <y1>    <x2>    <y2>  
<macro_name>    <x1>    <y1>    <x2>    <y2>  
// (x1, y1): lower-left corner, (x2, y2): upper-right corner  
... More macros
```

Figure 1 illustrates an example of the IO files:

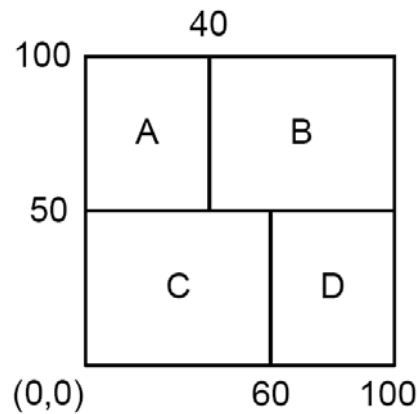


Fig. 1: A floorplan problem and its solution.

Input files: (input.block)

4
A 40 50
B 60 50
C 60 50
D 40 50

Output files: (output.rpt)

10000
100 100
0.24
A 0 50 40 100
B 40 50 100 100
C 0 0 60 50
D 60 0 100 50

3. Language/Platform

- 1.Language: C or C++.
- 2.Platform: Windows or Linux/Unix.

4. Command-line Parameters

In order to test your program, you are asked to add the following command-line parameters to your program: (e.g. Floorplan.exe input.block output.rpt)
[executable file name] [input file name] [output file name]

5. Advanced Features

Provide GUI (Graphic User Interface) to show the floorplanning result.

6. Submission:

You need to submit the following materials in a .tar or a .zip file (e.g., b90901130-p1.zip) at the course website by the deadline: (1) source codes, (2) executable binaries, (3) a text readme file (readme.txt), stating how to build and use your programs, (4) a report (report.doc) on the data structures used in your program.

7. Evaluation

This programming assignment will be graded based on the (1) correctness of the program, (2) solution quality, (3) running time, (4) report.doc, and (5) readme.txt. Please check these items before your submission.

8. Online Resources

You can download a sample input file (input.block), a sample readme.txt, a sample report .doc at the following URL:

<http://eda.ee.ntu.edu.tw/~crazying/eda06/Prog1Res.zip>