

1 Compile and Run

1.1 How to Compile

To compile the code:

```
g++ main.cpp fiduccia_mattheyses_algorithm.cpp -Wall -O3 -std=c++17 -o fm
```

1.2 How to Execute

To execute the code:

```
./fm [input file path] [output file path]
```

Example:

```
./fm input_pa1/input_0.dat output_0.dat
```

2 Partition Results

- Environment: CAE Machine
- `ssh [id]]@best-tux.cae.wisc.edu`

```
1  =====
2  running test data 0
3  duration: 123919 ms
4  [Check] Cut size = 4873 matched!
5  [Check] Balance passed:: 60300(min) < 60301(G1), 90449(G2) <
   90450(max)
6  =====
7  Congratulations! Legal Solution!!
8  =====
9
10 =====
11 running test data 1
12 duration: 10.4528 ms
13 [Check] Cut size = 1257 matched!
14 [Check] Balance passed:: 1485(min) < 1486(G1), 1514(G2) < 1515(max
   )
15 =====
16 Congratulations! Legal Solution!!
17 =====
18
19 =====
20 running test data 2
21 duration: 22.5366 ms
22 [Check] Cut size = 2243 matched!
23 [Check] Balance passed:: 3430(min) < 3568(G1), 3432(G2) < 3570(max
   )
24 =====
25 Congratulations! Legal Solution!!
26 =====
27
28 =====
29 running test data 3
```

```

30 duration: 522.675 ms
31 [Check] Cut size = 28472 matched!
32 [Check] Balance passed:: 29999.7(min) < 30002(G1), 36664(G2) <
    36666.3(max)
33 =====
34 Congratulations! Legal Solution!!
35 =====
36
37 =====
38 running test data 4
39 duration: 1118.42 ms
40 [Check] Cut size = 46298 matched!
41 [Check] Balance passed:: 74621.2(min) < 76126(G1), 74624(G2) <
    76128.8(max)
42 =====
43 Congratulations! Legal Solution!!
44 =====
45
46 =====
47 running test data 5
48 duration: 5103.88 ms
49 [Check] Cut size = 147292 matched!
50 [Check] Balance passed:: 189332(min) < 193156(G1), 189333(G2) <
    193157(max)
51 =====
52 Congratulations! Legal Solution!!
53 =====
54
55 =====
56 running test data 6
57 duration: 0.041938 ms
58 [Check] Cut size = 1 matched!
59 [Check] Balance passed:: 3e-08(min) < 1(G1), 5(G2) < 6(max)
60 =====
61 Congratulations! Legal Solution!!
62 =====

```

Listing 1: Test Results

3 Encountered Challenges

1. Initially, I thought I had to wait until the algorithm reached its maximum optimization, which may cause my program to exceed the time limitation. Later, I consulted with a TA and found I could manually select the number of PASS to execute.
2. When I initially ran the algorithm on our laboratory machine, the program only took about three minutes to run the code. However, it took roughly 7 minutes to complete when executed on the CAE machine. Consequently, I did some optimization in this heuristic algorithm. I thought that not all cells contributed to every PASS, so I established a threshold. If, during a PASS, the number of locked cells exceeded this threshold, the PASS would be terminated, and the next PASS would start, thereby enhancing program execution speed.