REPORT 4

ANALYSIS OF ALGORITHMS-I

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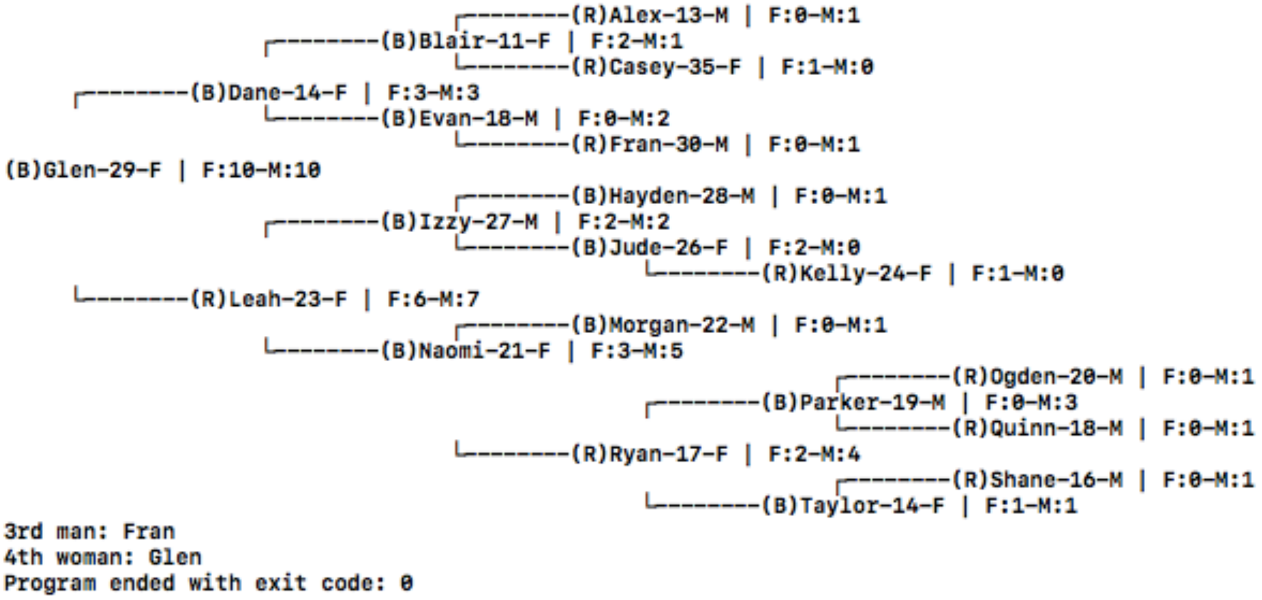
`Important:` In order to execute `=> g++ -std=c++11 *.cpp -o 150140707`

`Output of code:`



```
                                 ┌--------(R)Alex-13-M | F:0-M:1
                   ┌--------(B)Blair-11-F | F:2-M:1
                   |             └--------(R)Casey-35-F | F:1-M:0
     ┌--------(B)Dane-14-F | F:3-M:3
     |             └--------(B)Evan-18-M | F:0-M:2
     |                           └--------(R)Fran-30-M | F:0-M:1
(B)Glen-29-F | F:10-M:10
     |                           ┌--------(B)Hayden-28-M | F:0-M:1
     |             ┌--------(B)Izzy-27-M | F:2-M:2
     |             |             └--------(B)Jude-26-F | F:2-M:0
     |             |                           └--------(R)Kelly-24-F | F:1-M:0
     └--------(R)Leah-23-F | F:6-M:7
                   |             ┌--------(B)Morgan-22-M | F:0-M:1
                   └--------(B)Naomi-21-F | F:3-M:5
                                 |                           ┌--------(R)Ogden-20-M | F:0-M:1
                                 |             ┌--------(B)Parker-19-M | F:0-M:3
                                 |             |             └--------(R)Quinn-18-M | F:0-M:1
                                 └--------(R)Ryan-17-F | F:2-M:4
                                               |             ┌--------(R)Shane-16-M | F:0-M:1
                                               └--------(B)Taylor-14-F | F:1-M:1
3rd man: Fran
4th woman: Glen
Program ended with exit code: 0
```

`(Note: num_woman and num_man values also printed)`

`Question1)` Since Red-Black tree is a binary tree, if we want to update a key value of node, we have to consider that tree still holds the attributes for a binary tree. In other words, if we update the value of that node, it has to be larger than its children and smaller than its parents. In order to keep this attribute, rather than directly changing value of a node, we should delete the node while keeping necessary information and after that, we should insert node as a new node. This way, we can keep the functionality of a binary tree.

`Question2)` Since age value is an extra value of a node and not a key value, we can easily traverse whole tree and increment all age values. We can use in-order traverse in order to traverse tree and write a simple recursive function to modify age values. This action will not require to change color of nodes and also will not require any rotations since all the key values still same as before.