

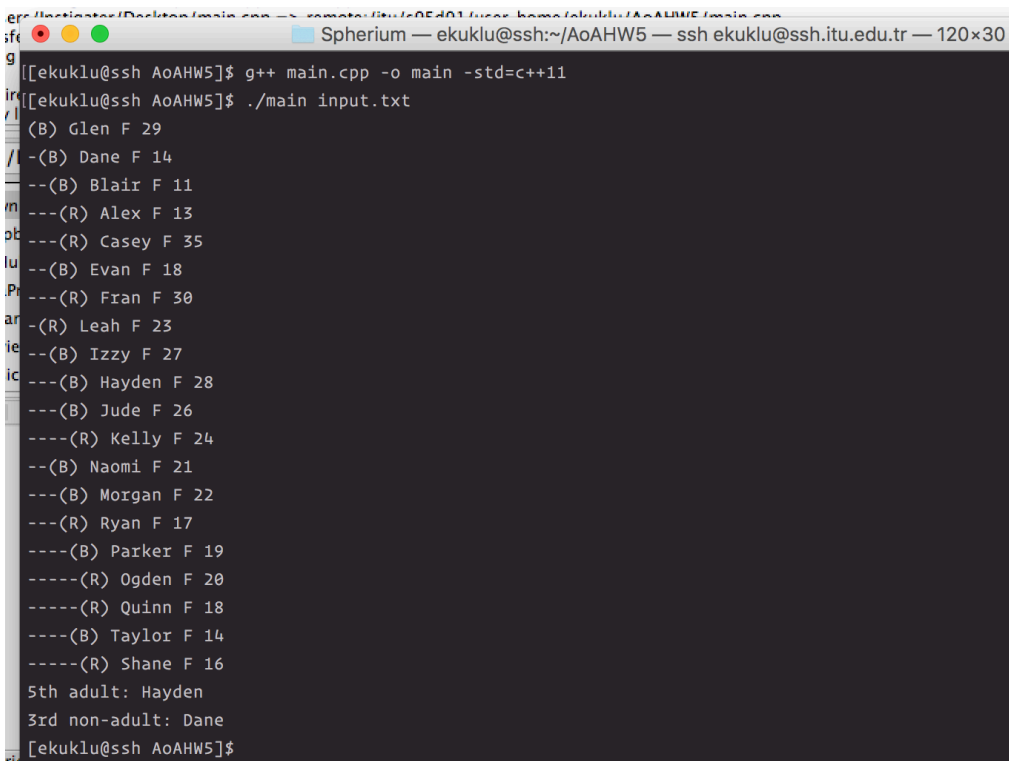
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ANALYSIS OF ALGORITHMS

ASSIGNMENT V

SCREENSHOT OF THE PROGRAM



```
er //hostinger/Desktop/main.cpp — Spharium — ekuklu@ssh:~/AoAHW5 — ssh ekuklu@ssh.itu.edu.tr — 120x30
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[ekuklu@ssh AoAHW5]$ g++ main.cpp -o main -std=c++11
[ekuklu@ssh AoAHW5]$ ./main input.txt
(B) Glen F 29
/(B) Dane F 14
--(B) Blair F 11
---(R) Alex F 13
---(R) Casey F 35
--(B) Evan F 18
---(R) Fran F 30
-(R) Leah F 23
--(B) Izzy F 27
---(B) Hayden F 28
---(B) Jude F 26
----(R) Kelly F 24
--(B) Naomi F 21
---(B) Morgan F 22
---(R) Ryan F 17
----(B) Parker F 19
----- (R) Ogden F 20
----- (R) Quinn F 18
----(B) Taylor F 14
----- (R) Shane F 16
5th adult: Hayden
3rd non-adult: Dane
[ekuklu@ssh AoAHW5]$
```

ANSWERS OF QUESTIONS

Briefly explain what you would do to correctly update the name of a person as a node in the Red-Black Tree.

Firstly, we would find the node with given name. Since red-black tree is also a binary search tree, we could find the proper node by using recursion technique. Then, we would delete that node and fix the table with following pseudocode:

```
PROCEDURE UPDATE-NODE(x, key):
P <- DELETE-NODE(x, key)
do while P is not root[x] and P is black
    if left[parent[P]] = P then
        J <- right[parent[P]]
        if color[J] is RED then
            RECOLOR(J)
            LEFT-ROTATE(parent[P])
        if color[right[J]] is BLACK and color[left[J]] is BLACK then
            RECOLOR(J)
            parent[P] <- P
        else if color[right[J]] is BLACK then
            RECOLOR(J)
            RIGHT-ROTATE(parent[P])
    else
        <<<same procedure for else but left and right swapped>>>
INSERT-NODE(x, key)
```

Briefly explain what you would do to correctly increment(by 1) the ages of all people in the Red-Black Tree.

Just like our print function, one might increment age field of all nodes with recursive approach:

```
PROCEDURE INCREMENT-AGES(x):

age[x] <- age[x] + 1

if left[x] exists then
    INCREMENT-AGES(left[x])

if right[x] exists then
    INCREMENT-AGES(right[x])
```