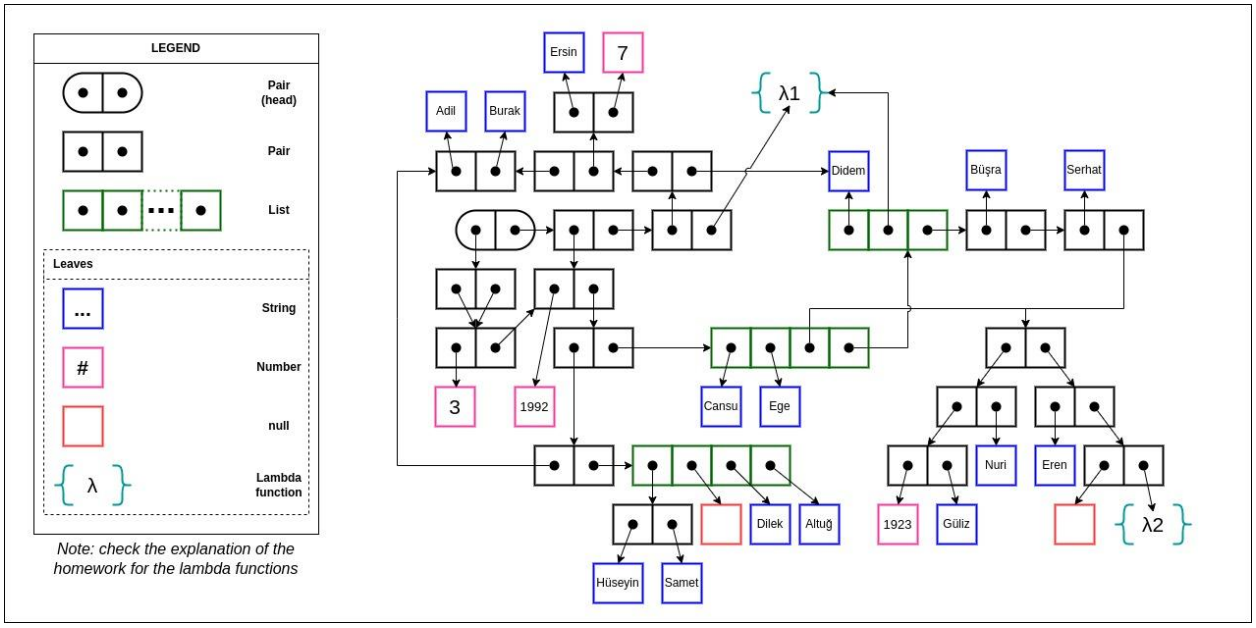
CENG 212
Programming Assignment 1

In this programming assignment, you are supposed to write a Scheme(Racket) program. The assignment is composed of 3 parts. You have to correctly implement a Part before moving on to the next.



Part 1

Represent the whole relationship in the figure within the code. Each arrow indicates a "**has**" relationship, for example, the topmost Pair has "Ersin" and 7. The types of boxes are explained in the legend. Note that the type Pair is distinct from the type List, and is defined by using ***cons*** function. Here are the lambda functions' definitions:

- λ1(lambda1): takes a Number and returns its' square
- λ2(lambda2): prints the String "I am a simple lambda function which only prints to screen :)"

Part 2

Write a procedure that explores the items recursively by following the links. The definition of the procedure must be

(define (**myproc** *v1 v2 v3*) **…**)
Where

- *v1* is an item
- *v2* is used as a predicate
- *v3* is used as a function to apply on *v1*

You must replace **…** with a function body that performs the following actions
If the item is encountered before, then do nothing; otherwise, if the item is

- a Pair, then the procedure must first move on to the right item and then the left.
- a List, then the procedure must move on to all items in reverse order, i.e. from right to left.
- a Leaf node
  - and null, then the procedure does nothing.
  - and either a String or a Number, then the procedure must check whether the given predicate(*v2*) is evaluated true(#t) when applied to the item. If it is true then the procedure must apply the given function(*v3*) on the item; if it is false(#f), it does nothing.
  - and a Lambda function, then the procedure must apply this lambda function by using it in the given function(*v3*) as the argument.

Part 3

After you implement the procedure in **Part 2**, you are supposed to implement each bullet point below in the Scheme code. Each must be done by calling **myproc** with appropriate parameters.

- Write a statement that prints the elements of types of String, Number, and Lambda functions. Output must be:

```
#<procedure:lambda1>
"Didem"
7
"Ersin"
"Burak"
"Adil"
#<procedure:lambda2>
"Eren"
"Nuri"
"Güliz"
1923
"Serhat"
"Büşra"
"Ege"
```

```
"Cansu"
"Altuğ"
"Dilek"
"Samet"
"Hüseyin"
1992
3
```

- Write a statement that prints all prime numbers. Output must be:

```
7
3
```

- Write a statement that prints the elements of type String whose sizes are greater than 5. Output must be:

```
"Serhat"
"Hüseyin"
```

- Write a statement that calls Lambda functions which takes one parameter with Number 17 and prints the result.
- Write a statement that calls Lambda functions which takes no parameters and prints the result.

Submission Rules

The submission must:

- be performed via Microsoft Teams
- be a text file that contains the source code
- must include comments if necessary
- follow a specific naming convention such that CENG212_PA1_ID
- be submitted before the due date

Submissions that do not comply with the rules above are penalized.