# Assignment 1

## Building Binary Trees

You are asked to program a binary tree.

a. Formulate a class `Node` with attributes `left` and `right`. The class offers an abstract method `getInfo`.

b. Formulate the following non-abstract classes which are derived from Node

   - `IntNode` storing integer values as information
   - `StrNode` storing string values as information

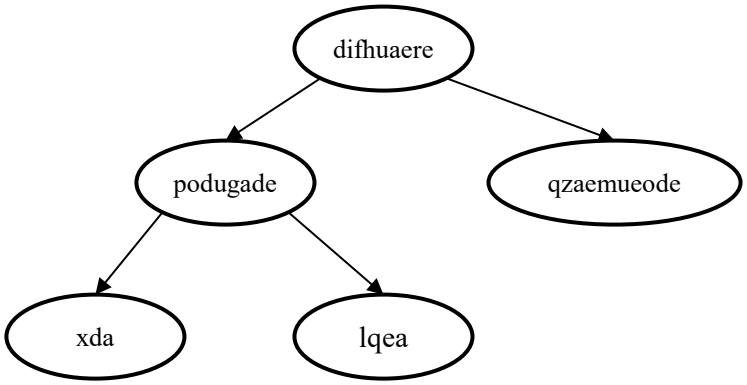
     In addition to the string an object of class `StrNode` stores the number of vowels in the string as an attribute.

c. Formulate a class `BinTree`. Objects of type `BinTree` represent binary trees. The binary tree of an object of type `BinTree` can be built by either `IntNode`-objects or `StrNode`-objects (but not of both!). Beside the root of the tree an object of type `BinTree` stores the type of node used for the tree. A method of `BinTree` allows to create objects of the specified node type.

d. While comparing integer values is obvious the comparison of two objects of type `StrNode` is based on the following rules:

   - objects `s1` and `s2` are equal, iff their strings are equal (obviously)
   - object `s1` is lower equal than object `s2`, iff their strings are different and the number of vowels in string of `s1` is lower equal than the number of vowels in string of `s2`
   - object `s1` is greater than object `s2`, iff their character sequences are different and the number of vowels in string of s1 is greater than the number of vowels in string of `s2`

   The following figure shows a binary tree for objects of type `StrNode`.




e. In the class BinTree implement a single method `insert` that creates a new node (using the type information stored in the BinTree-object) and that inserts the node into the tree, respecting the order relation of the binary tree. The information value (either integer or string) is passed to the insert method.

Prepare your solution using PyCharm

- create a PythonPackage with name BinarySearchTrees
- create a file bintrees.py in the package
  this file contains the node classes and the BinTree-class
- create a file main.py in the project's director
  this file creates
  - a BinTree-object ibt for IntNode-nodes and inserts 12, 56, 4 and 8
  - a BinTree-object sbt for StrNode-nodes and inserts 'difhuaere', 'qzaemueode', 'podugade', 'xda' and 'lqea'