

## 2-3 trees

DATE:

PAGE:

class Node:

```
def __init__(self, data, par=None):  
    self.data = list(data)  
    self.par = par  
    self.child = list()
```

```
def add(self, newnode):  
    self.data.extend(newnode.data)  
    self.data.sort()  
    self.child.extend(newnode.child)  
    if len(self.child) > 1:  
        self.child.sort()  
    if len(self.data) > 2:  
        self.split()
```

```
def insert(self, node):
```

```
    if isleaf():  
        self.add(newnode)  
    elif newnode.data[0] > self.data[-1]:  
        self.child[-1].insert(newnode)  
    else:  
        for i in range(0, len(self.data)):  
            if node.data[0] < self.data[i]:  
                self.child[i].insert(node)  
                break.
```

```
def split(self, item):
```

```
    if item < self.data[0]:  
        left = Node(self.data[0])  
        right = Node(self.data[2])
```

```

if self.child:
    self.child[0].parent = leftChild
    self.child[1].parent = left
    self.child[2].parent = right
    self.child[3].parent = right

```

```

self.child = [leftChild]
self.child.append(rightChild)
self.data = [self.data[1]]

```

```

def delete(self, element):

```

```

    pos = self.find(element)

```

```

    if pos == False:

```

```

        return

```

```

    if pos.isleaf():

```

```

        pos.data.remove(element)

```

```

    elif len(pos.data) == 1:

```

```

        if len(pos.child) == 2 & pos.child[1] != None,

```

```

            val = pos.child[0].data

```

```

            pos.child[0] = None

```

```

            pos.data.extend(val)

```

```

            pos.data.remove(element)

```

```

            pos.data.sort()

```

```

        return

```

```

    elif len(pos.child) == 2 and pos.child[1] != None

```

```

        val = pos.child[1].data

```

```

        pos.data.extend(val)

```

```

        pos.child[1] = None

```

```

        if len(pos.data) > 2

```

```

            pos.split

```