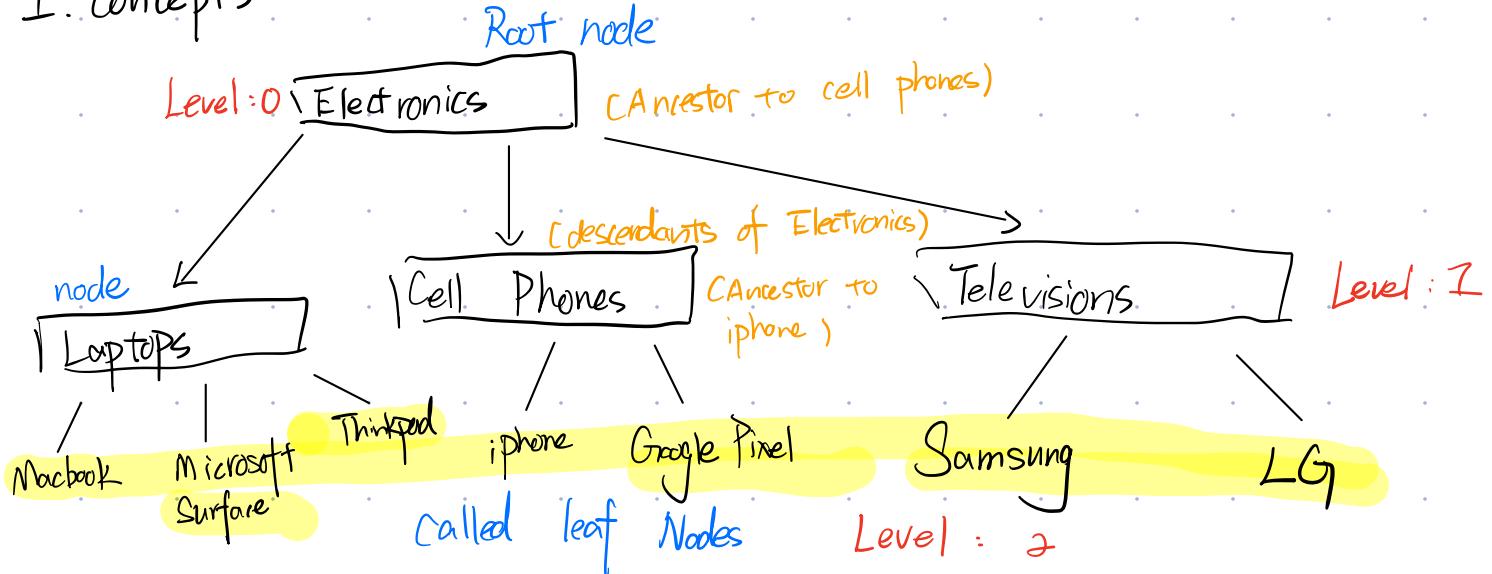


## 1. Concepts



- binary tree: each parents will only have two children.

leaf Nodes: don't have any children  
or subcategories

## Build tree in Python

code :

Class TreeNode

```
def __init__(self, data):
```

`self.data = data`

self.children = [ ]

self.parent = None

Child is an instance of  
tree node class

★ child.parent = self  
self.children.append(child)

entire process

```
class Node:
    def __init__(self, name):
        self.name = name
        self.parent = None
        self.children = []

    def build_product_tree(self):
        root = TreeNode("Electronics")
        laptop = TreeNode("Laptop")
        laptop.add_child(TreeNode("Dell"))
        laptop.add_child(TreeNode("Acer"))
        laptop.add_child(TreeNode("Surface"))
        laptop.add_child(TreeNode("Thinkpad"))

        cell_phone = TreeNode("Cell Phone")
        cell_phone.add_child(TreeNode("iPhone"))
        cell_phone.add_child(TreeNode("Google Pixel"))
        cell_phone.add_child(TreeNode("Huawei"))

        tv = TreeNode("TV")
        tv.add_child(TreeNode("Samsung"))
        tv.add_child(TreeNode("LG"))

        root.add_child(laptop)
        root.add_child(cell_phone)
        root.add_child(tv)

        return root
```

electronics category will have laptop, cell phone and TV as a

```
def print_tree (self):
```

```
print(self.data)
```

if self. children :

for child in self.children:

    child.print\_tree()

def get\_level(self):

    level = 0

    p = self.parent

    while p:

        level += 1

        p = p.parent

    return level