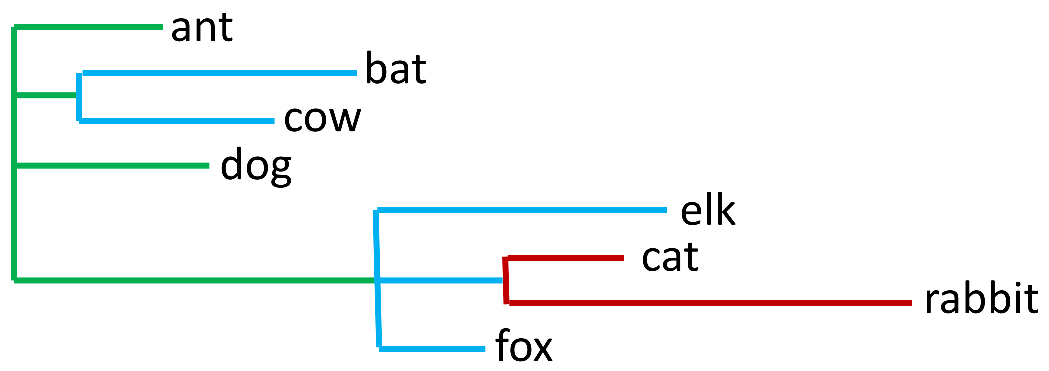
# Newick tree bipartitions algorithm

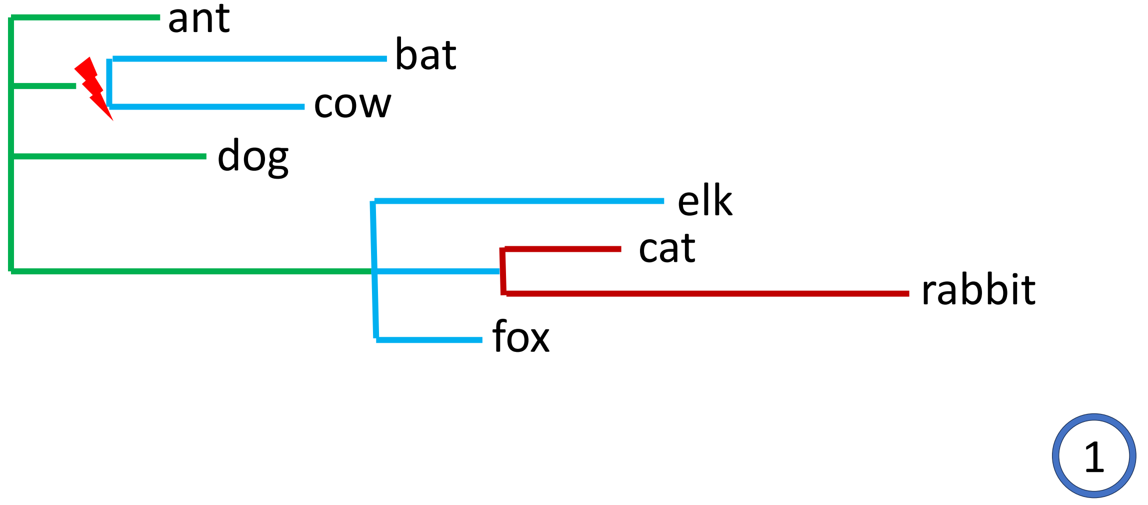
# Newick format

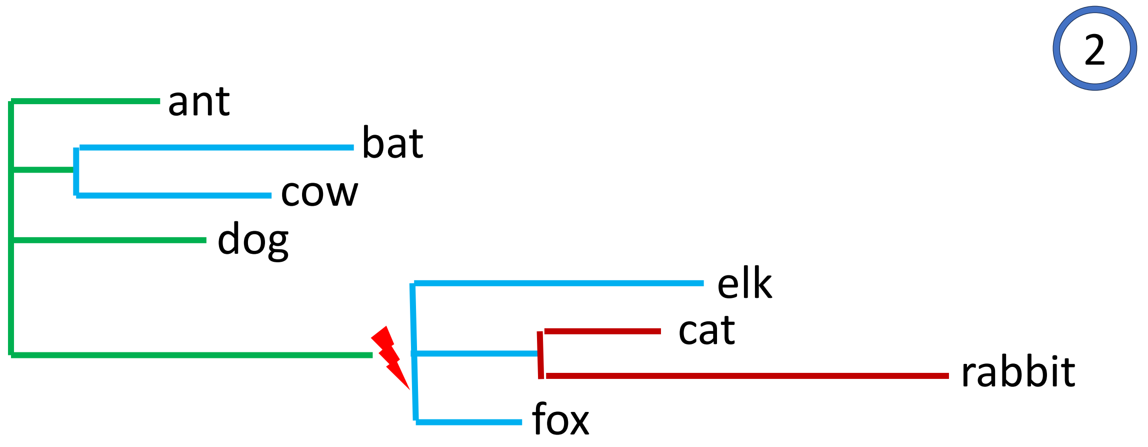
(ant, (bat, cow), dog, (elk, (cat, rabbit), fox));

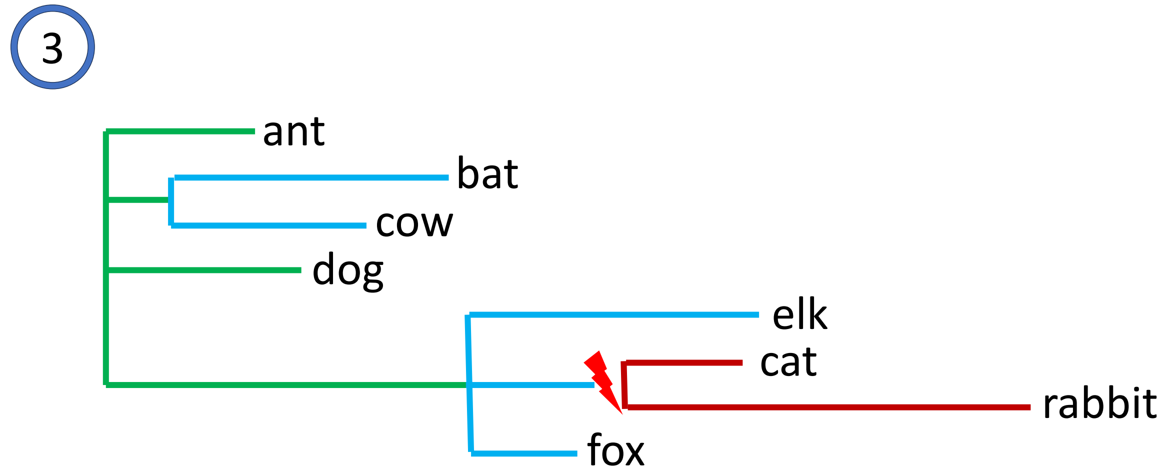


# Possible bipartitions

(ant, (bat, cow), dog, (elk, (cat, rabbit), fox));







## Algorithm

(ant, (bat, cow), dog, (elk, (cat, rabbit), fox));

### 1 Splitting Newick by levels

**vector<pair<string, int>>** :

(ant ; 0) , (bat , cow ; 1) , (dog ; 0) , (elk ; 1) , (cat, rabbit ; 2) , (fox ; 1)

### 2 Cutting initial vector by levels

**IF level changes :**

(bat , cow ; **1**) , (dog ; **0**) , (elk ; 1) , (cat, rabbit ; 2) , (fox ; 1)

(elk ; **1**) , (cat, rabbit ; **2**) , (fox ; **1**)

(cat, rabbit ; **2**) , (fox ; **1**)

Returns → **vector<string>**

# Algorithm

(ant, (bat, cow), dog, (elk, (cat, rabbit), fox))

## 3 Creating bipartition pairs from previous vector<string>

(bat, cow) , (elk, cat, rabbit, fox) , (cat, rabbit)

(bat, cow) , (**all species** – bat and cow )

(elk, cat, rabbit, fox), (**all species** - elk, cat, rabbit, fox)

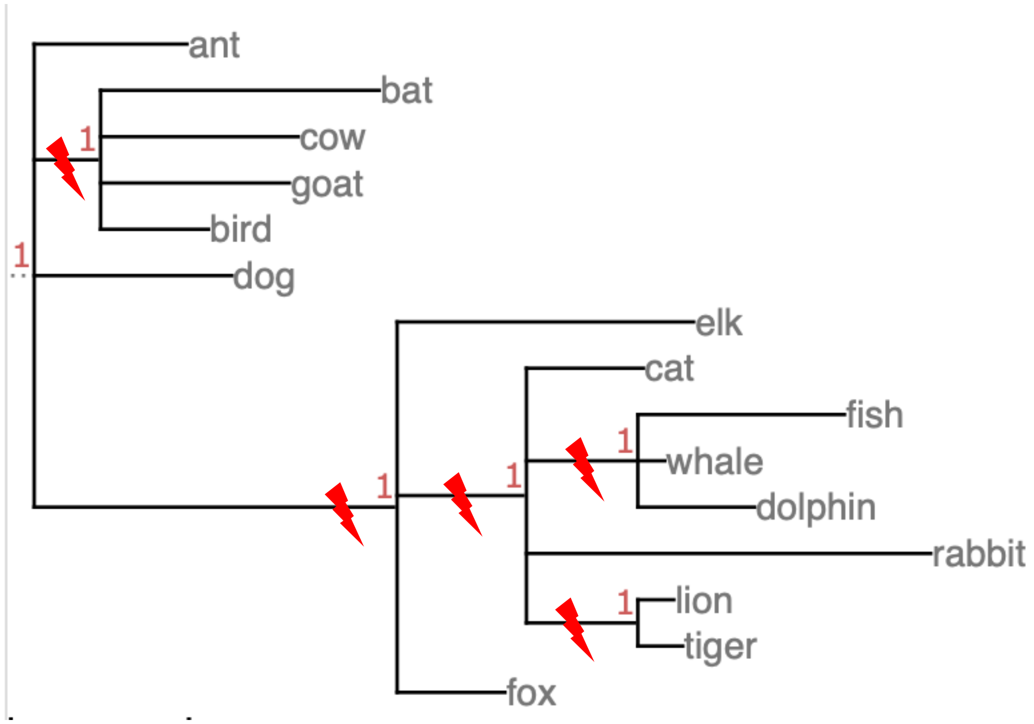
(cat, rabbit), (**all species** - cat, rabbit)

Returns **vector<pair<list<string>, list<string>>>**

Vector<list<string>>

# Execution example :

(ant:17, (bat:31, cow:22, goat:21, bird:12):7, dog:22, (elk:33, (cat:13, (fish:23, whale:3, dolphin:13):12, rabbit:45, (lion:4, tiger:5):12):14, fox:12):40)



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FIRST :       FIRST :       FIRST :       FIRST :       FIRST :
bat           elk           cat           fish          lion
cow           cat           fish          whale         tiger
goat          fish          whale         dolphin       ------
bird          whale         dolphin       ---------     SECOND :
---------     dolphin       rabbit        SECOND :      bat
SECOND :      rabbit        lion          bat           cow
fish          lion          tiger         cow           goat
whale         tiger         ---------     goat          bird
dolphin       fox           SECOND :      bird          fish
lion          -----------   bat           lion          whale
tiger         SECOND :      cow           tiger         dolphin
cat           bat           goat          cat           cat
rabbit        cow           bird          rabbit        rabbit
elk           goat          elk           elk           elk
fox           bird          fox           fox           fox
ant           ant           ant           ant           ant
dog           dog           dog           dog           dog
```