

# Árboles

Carlos Miguel Soto

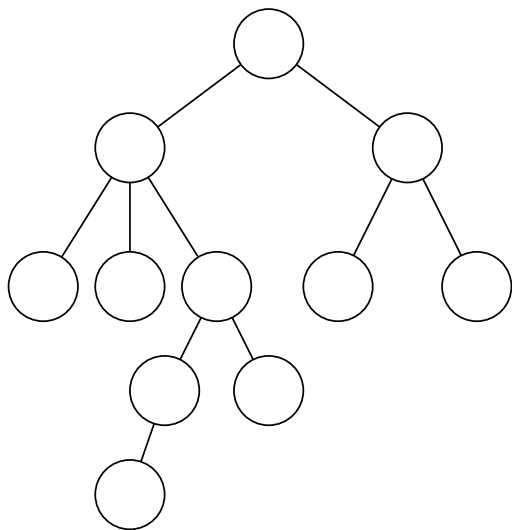
Universidad de Buenos Aires, FCEN

TC Medellín – 2023

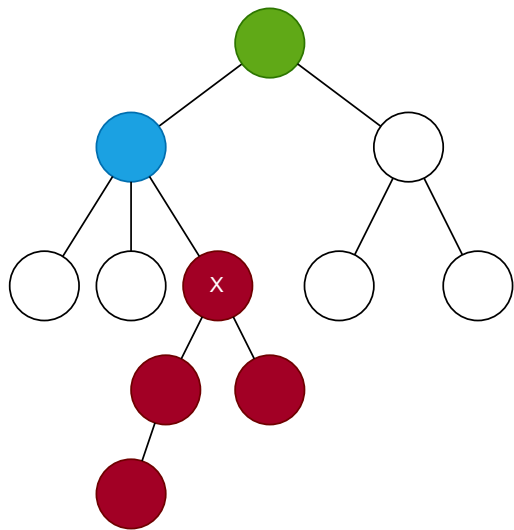
# Feedback

`https://reedef.dev/feedback`

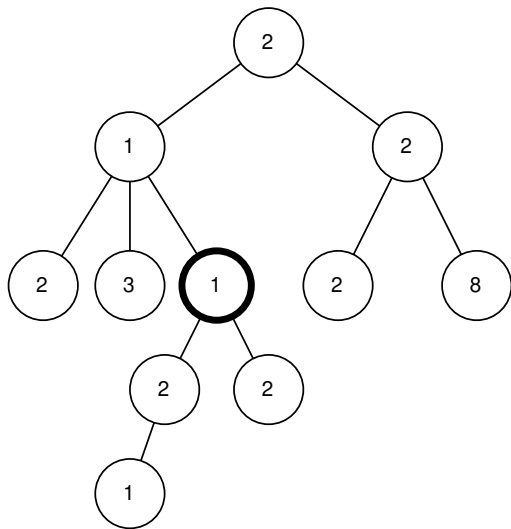
# Árboles



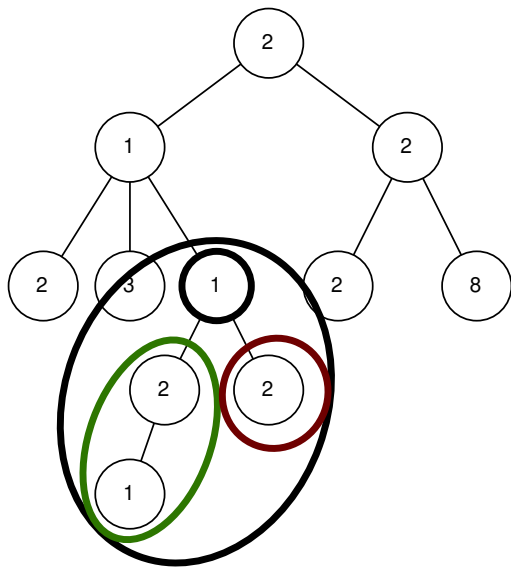
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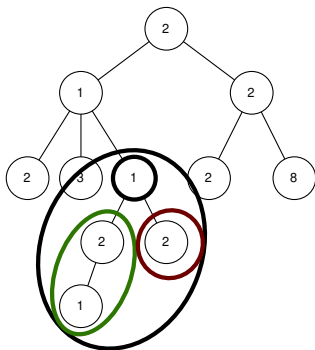
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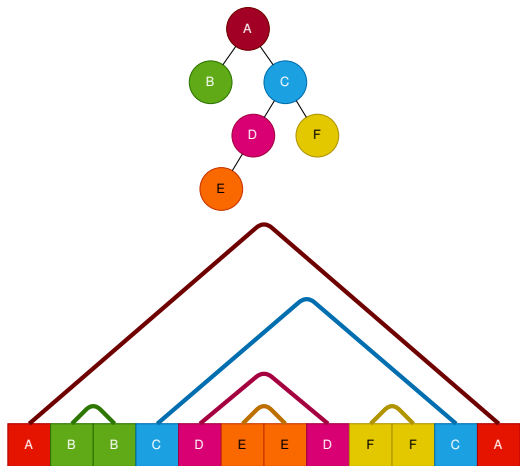


$\text{suma}[\text{nodo}] = 0$

```
for hijo in hijos[nodo]:  
    suma[nodo] += suma[hijo]
```

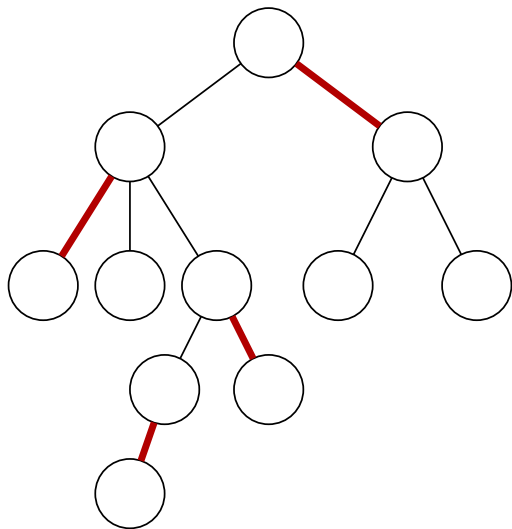
```
suma[nodo] += valor[nodo]
```

# Euler Tours

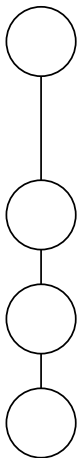
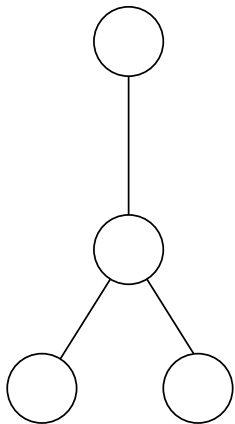




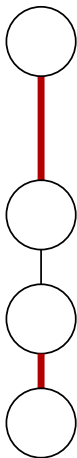
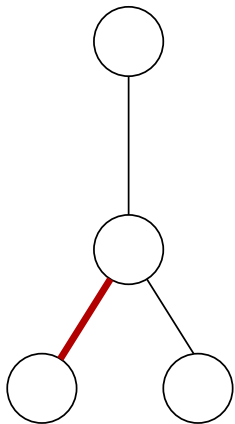
# Matching Máximo en Árboles



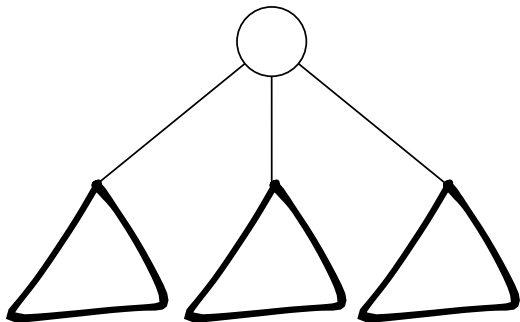
# Matching Máximo en Árboles



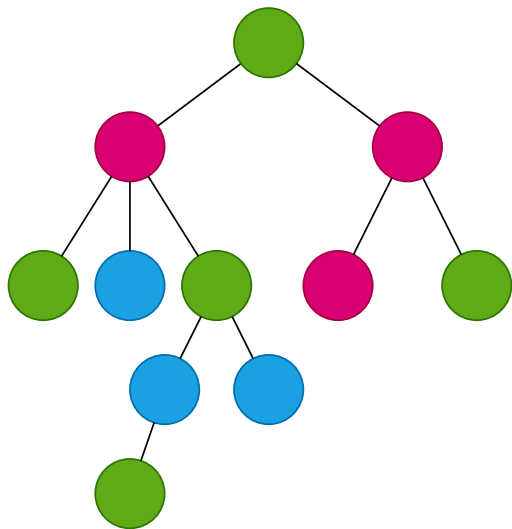
# Matching Máximo en Árboles



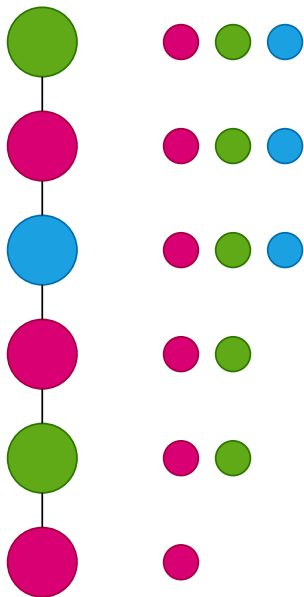
# Matching Máximo en Árboles



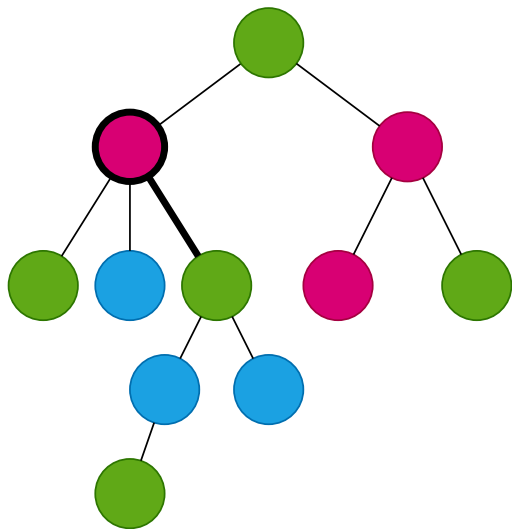
## Colores Distintos en el Subarbol



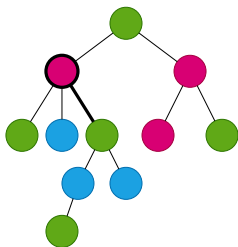
# Arbol Palito



## Small To Large



## Small To Large



```
swap(colores[nodo], colores[hijo_mas_grande[nodo]])
```

```
for hijo in hijos[nodo]:  
    if hijo != hijo_mas_grande[nodo]:  
        for color in colores[hijo]:  
            colores[nodo].insert(color)
```

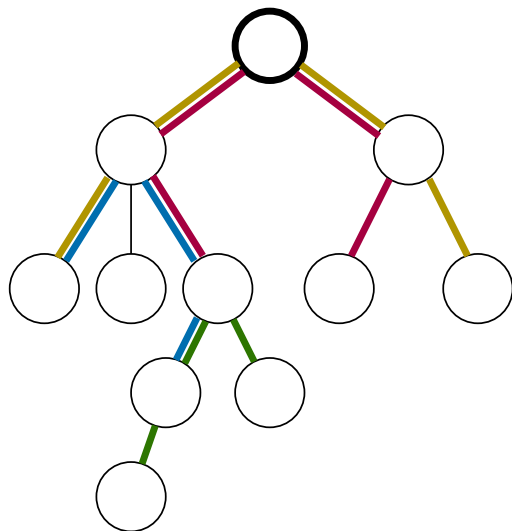
```
colores[nodo].insert(color[nodo])
```



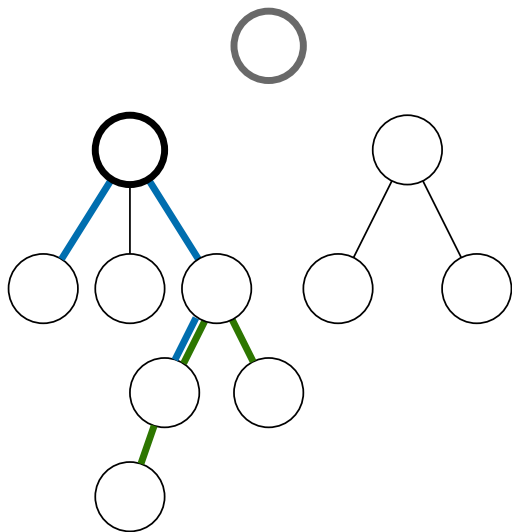
# Small To Large: Aplicaciones

Problema: Contar la cantidad de caminos de longitud  $k$ .

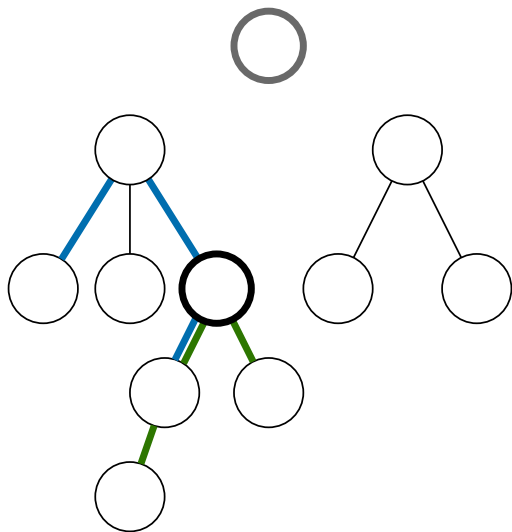
# Centroid Decomposition



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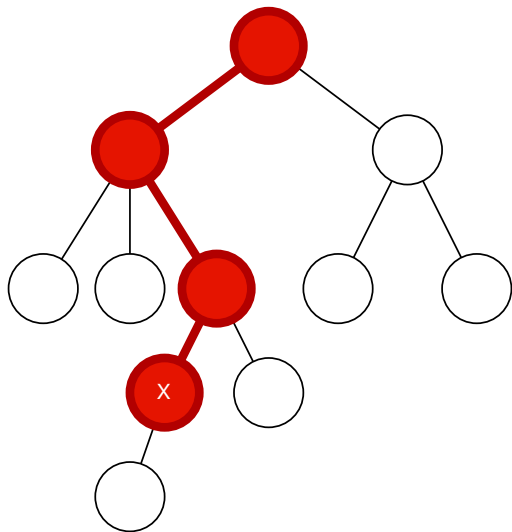


# Centroid Decomposition: Aplicaciones

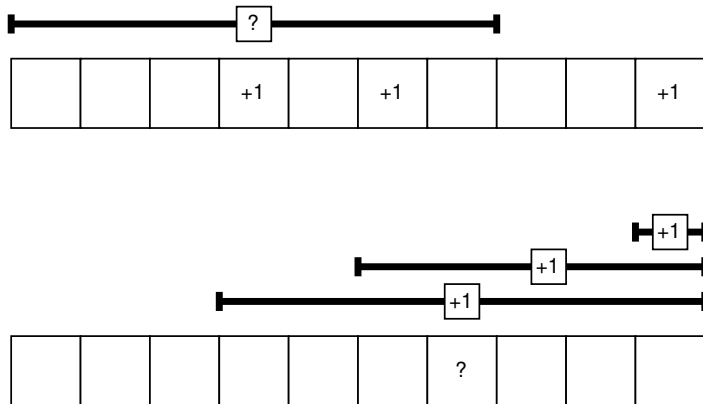
Problema:

- ▶ Agregar y Sacar “transmisores” de los nodos
- ▶ Devolver el transmisor más cercano.

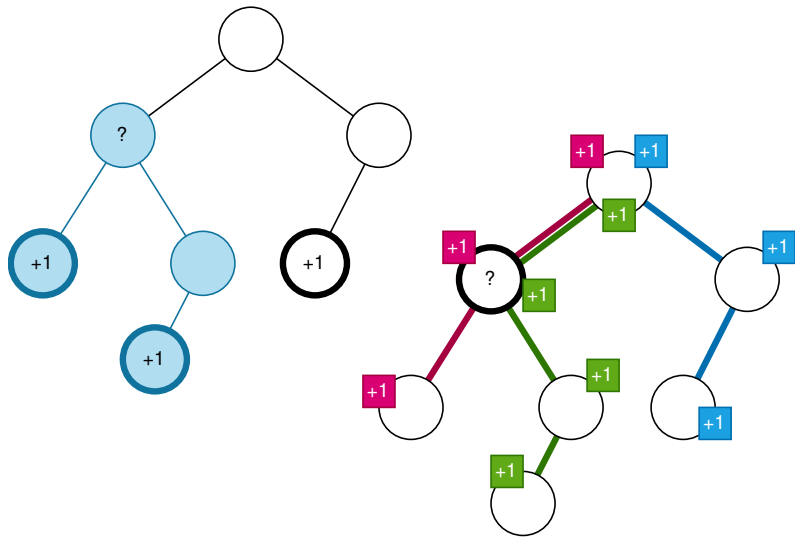
# Path Queries



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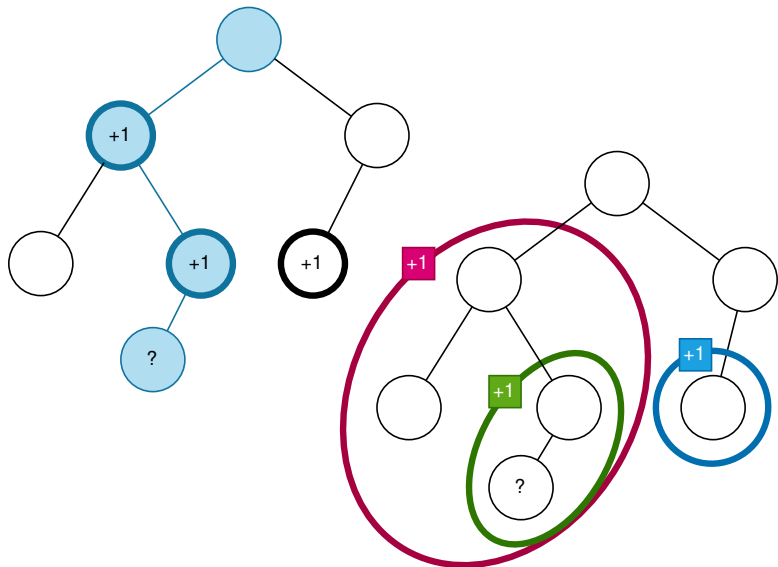


# Path Queries

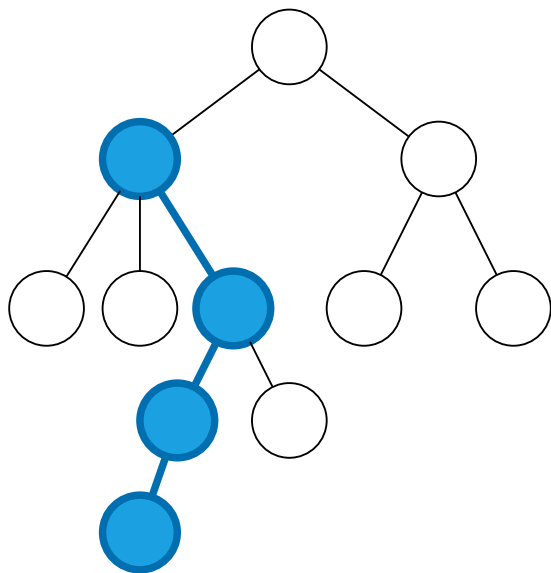




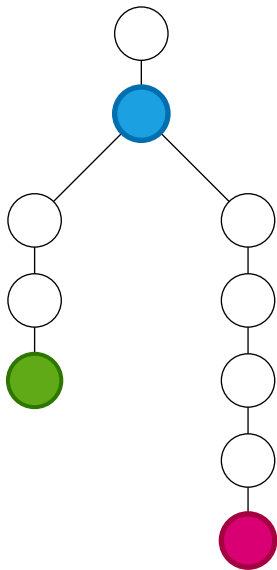
# Path Queries



## Paths Parciales



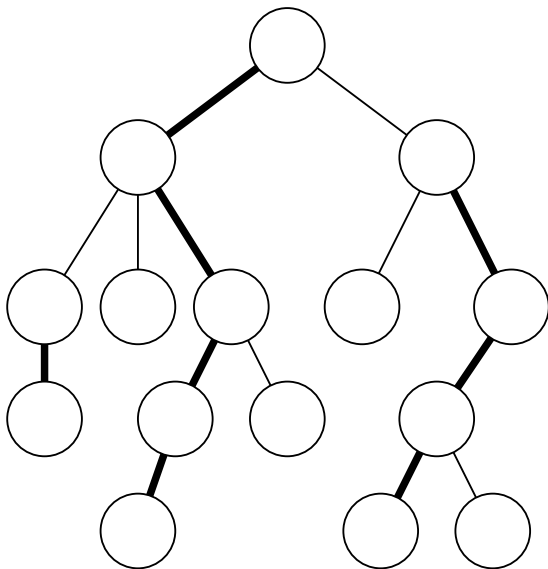
# LCA – Lowest Common Ancestor



# Aplicación: Distancia Min-Max

Problema: te dan un grafo y queries de distancia min-max

# HLD – Heavy-Light Decomposition



## Bonus: Tree Reroot

