

# Algoritmos e Estruturas de Dados III

Aula 3.3 intercalação por substituição

Prof. Felipe Lara

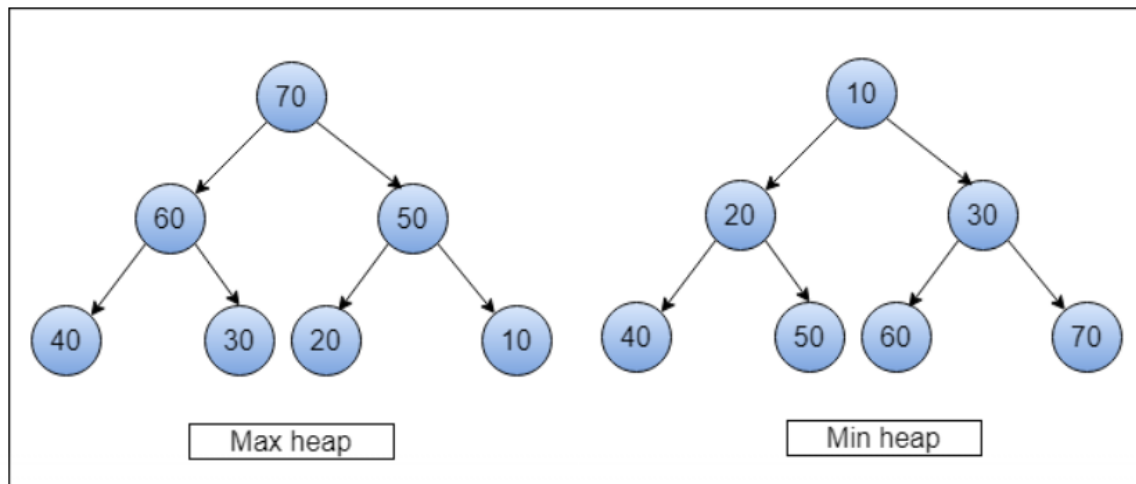


**PUC Minas**

# Intercalação com seleção por substituição

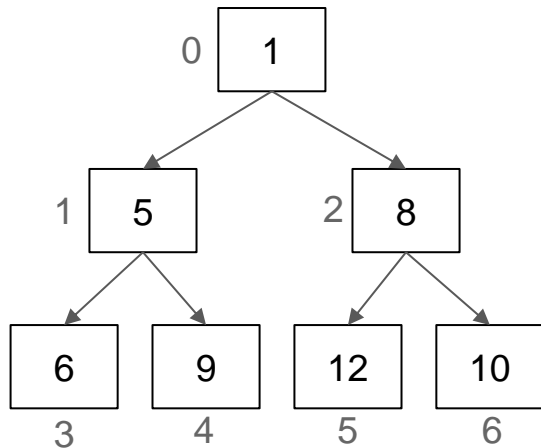
A segunda estratégia de otimização é de gerar segmentos ordenados maiores na fase de distribuição

Requer o uso de uma fila de prioridades, como um heap.



# Intercalação com seleção por substituição

0	1	2	3	4	5	6
1	5	8	6	9	12	10



Operações:

- Inserir novo elemento (na raiz e afundá-lo)
- Remover a raiz (colocar o último elemento lá e afundá-lo)

$$\text{filhoesquerdo}(i) = i * 2 + 1$$

$$\text{filhodireito}(i) = i * 2 + 2$$

$$\text{pai}(i) = \text{int}((i-1)/2)$$

# Intercalação com seleção por substituição

Arquivo a ser ordenado:

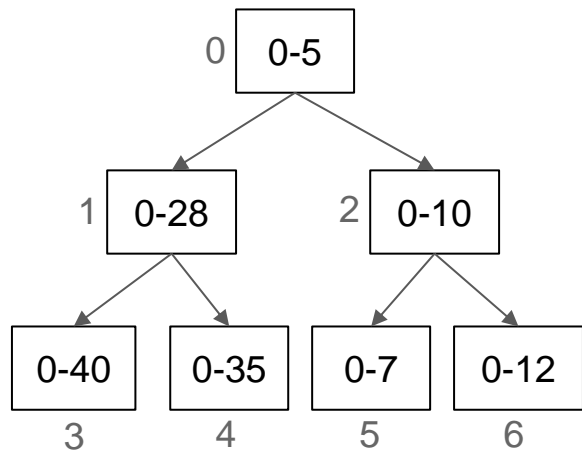
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Passo 1: Preenchimento do heap

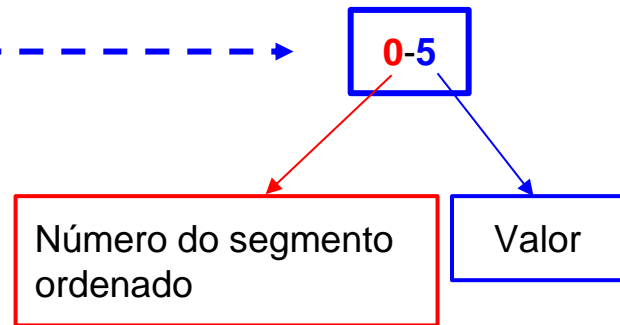
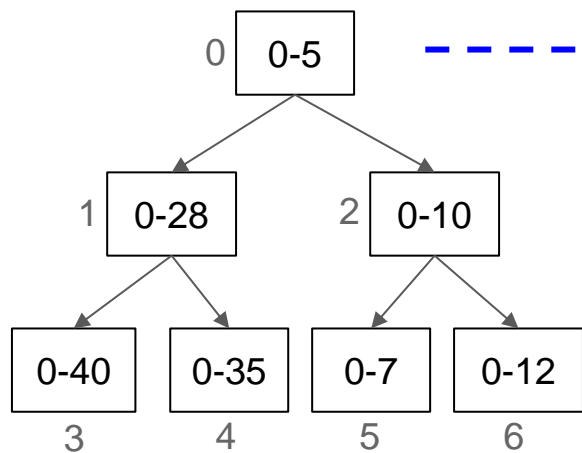
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-5	0-28	0-10	0-40	0-35	0-7	0-12



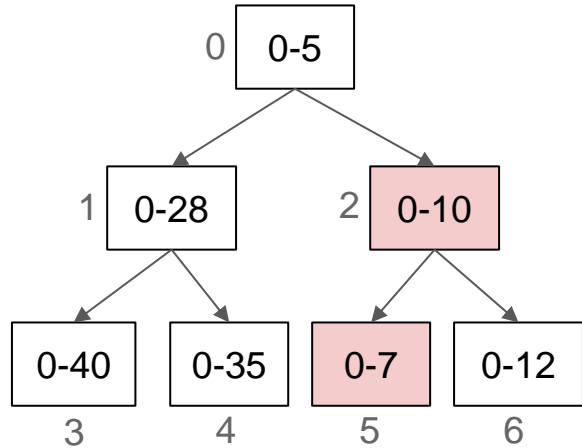
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-5	0-28	0-10	0-40	0-35	0-7	0-12



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-5	0-28	0-10	0-40	0-35	0-7	0-12

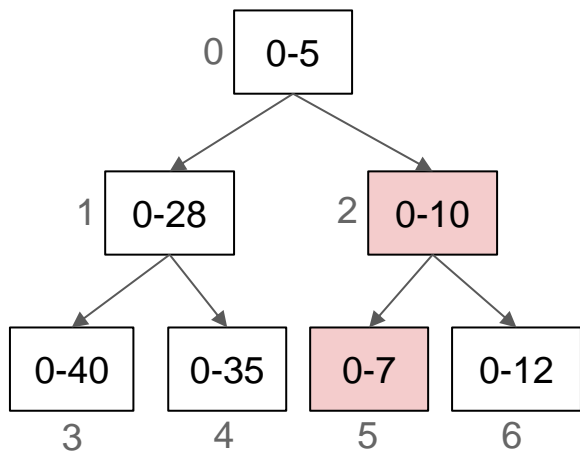


Passo 2: Organização do Heap



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

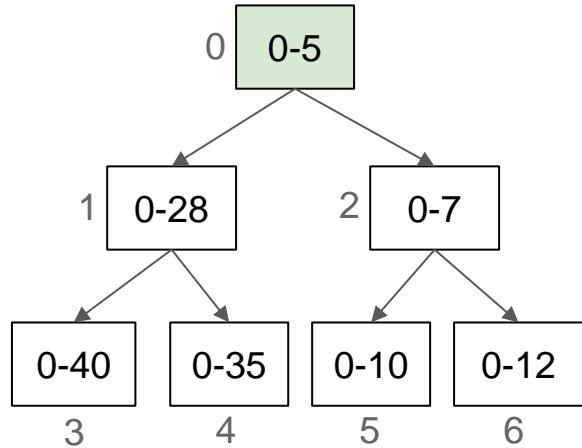
0	1	2	3	4	5	6
0-5	0-28	0-10	0-40	0-35	0-7	0-12



Da posição  $(n-1)/2$ , que representa o primeiro pai, até a posição 0, afundar cada elemento.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-5	0-28	0-7	0-40	0-35	0-10	0-12

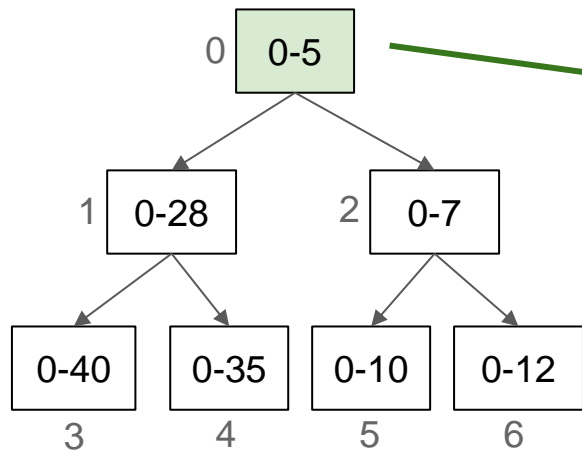


Heap organizado:  
Retira o menor elemento!

Saídas:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-5	0-28	0-7	0-40	0-35	0-10	0-12



Heap organizado:  
Retira o menor elemento!

Saídas:

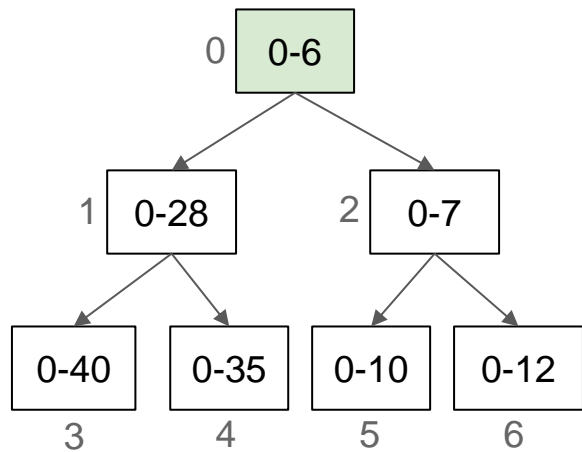
Arq 1:

5

Arq 2:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-6	0-28	0-7	0-40	0-35	0-10	0-12



Saídas:

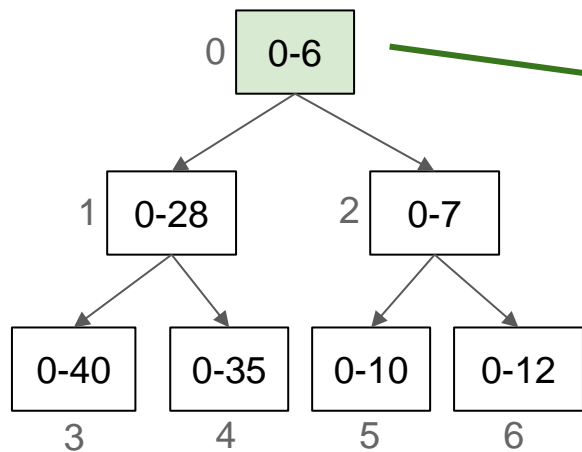
Arq 1:

5

Arq 2:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-6	0-28	0-7	0-40	0-35	0-10	0-12



Arq 1:

5	6
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Arq 2:

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Heap organizado:  
Retira o menor elemento!

Saídas:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-21	0-28	0-7	0-40	0-35	0-10	0-12

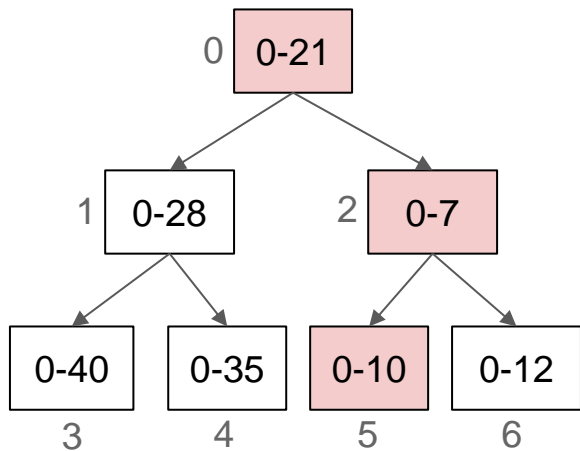
Saídas:

Arq 1:

5	6
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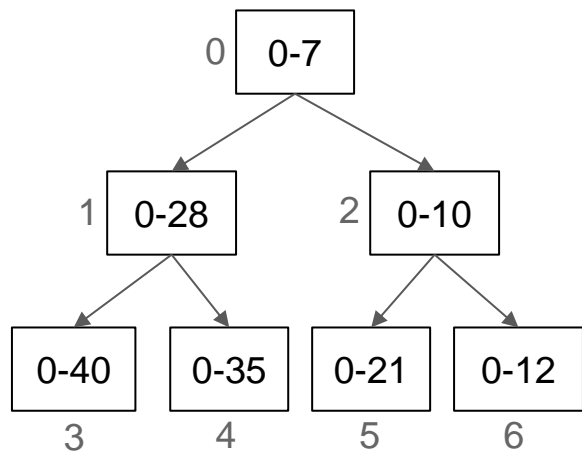
Arq 2:

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-7	0-28	0-10	0-40	0-35	0-21	0-12



Saídas:

Arq 1:

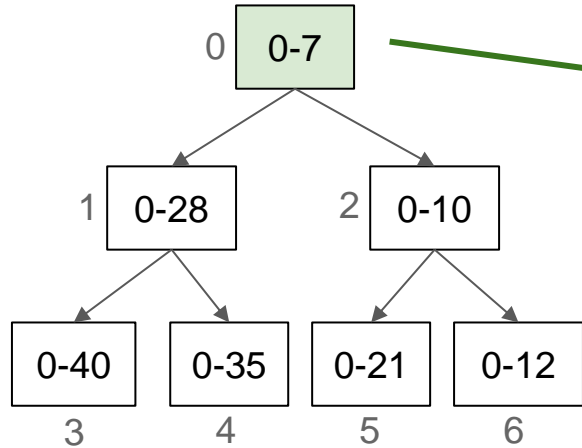
5	6
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Arq 2:

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-7	0-28	0-10	0-40	0-35	0-21	0-12



Arq 1:

5	6	7
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Arq 2:

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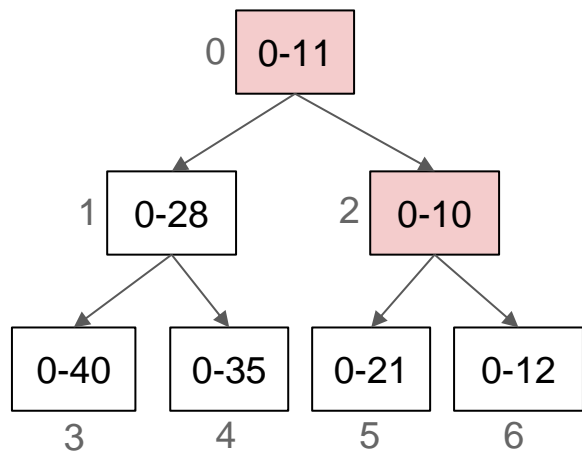
Heap organizado:  
Retira o menor elemento!

Saídas:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-11	0-28	0-10	0-40	0-35	0-21	0-12



Saídas:

Arq 1:

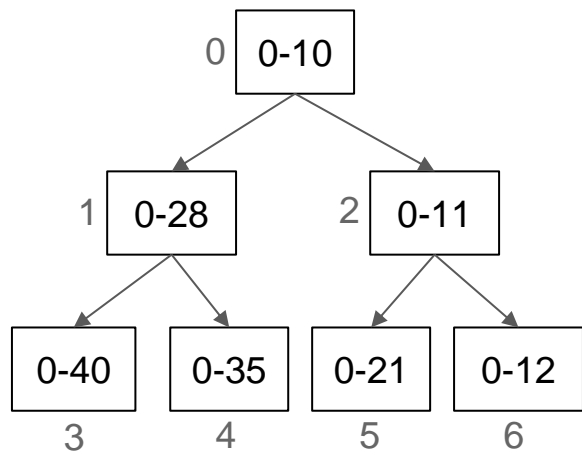
5	6	7
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Arq 2:

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-10	0-28	0-11	0-40	0-35	0-21	0-12



Saídas:

Arq 1:

5	6	7
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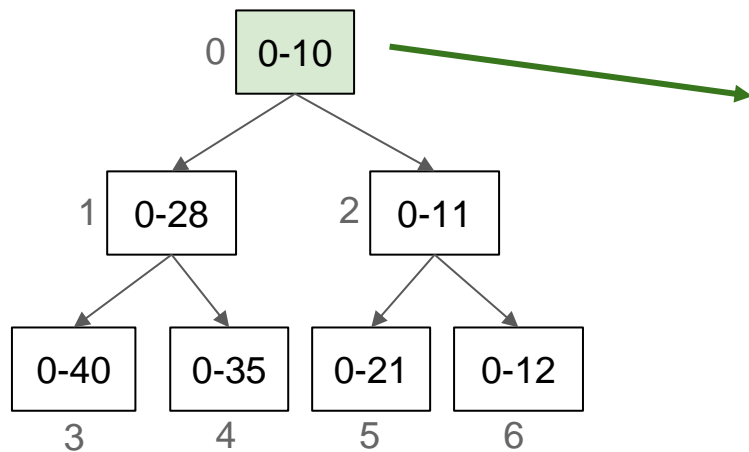
Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-10	0-28	0-11	0-40	0-35	0-21	0-12

Saídas:



Arq 1:

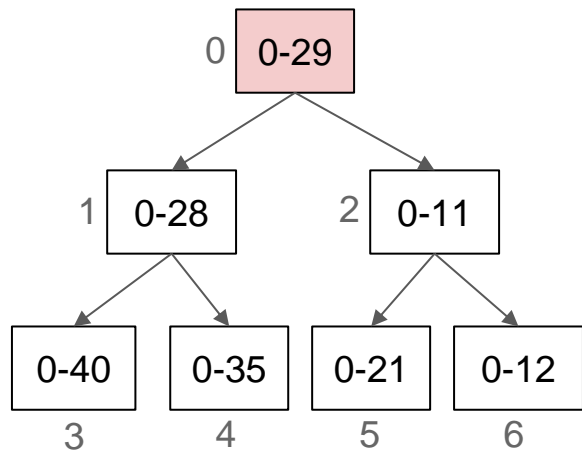
5	6	7	10
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Arq 2:

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

0	1	2	3	4	5	6
0-29	0-28	0-11	0-40	0-35	0-21	0-12



Saídas:

Arq 1:

5	6	7	10
---	---	---	----

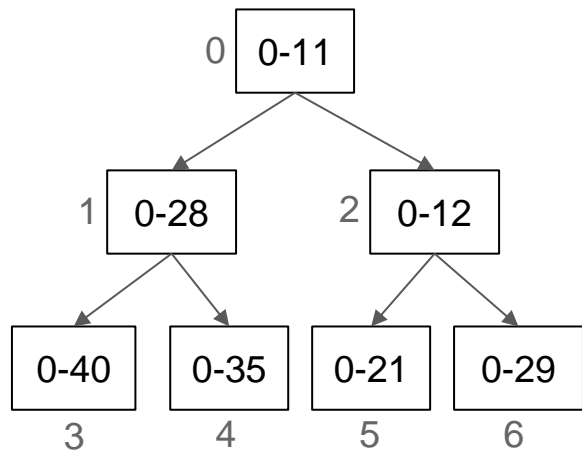
Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Estou retirando o vetor, mas ele  
existe!

Saídas:



Arq 1:

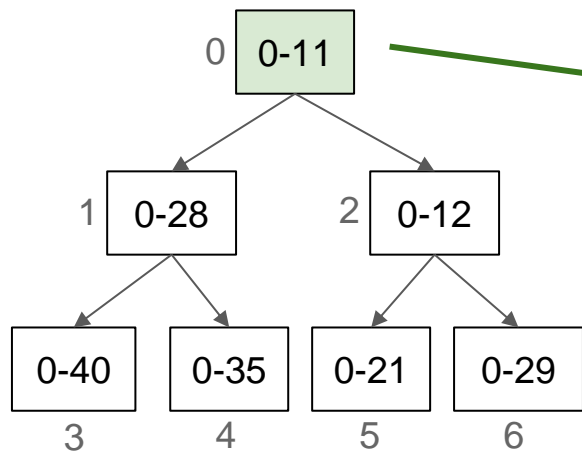
5	6	7	10
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Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

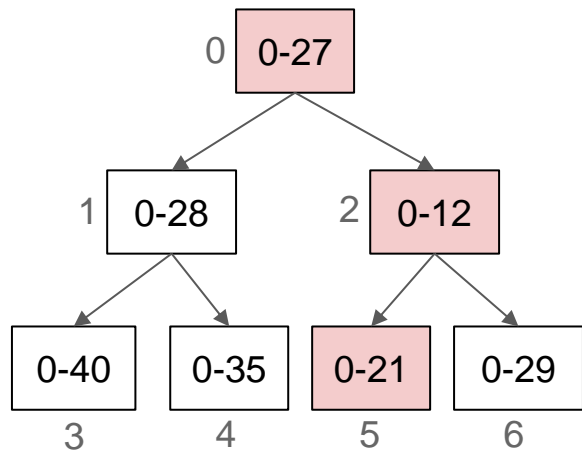
5	6	7	10	11
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Arq 2:

--

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

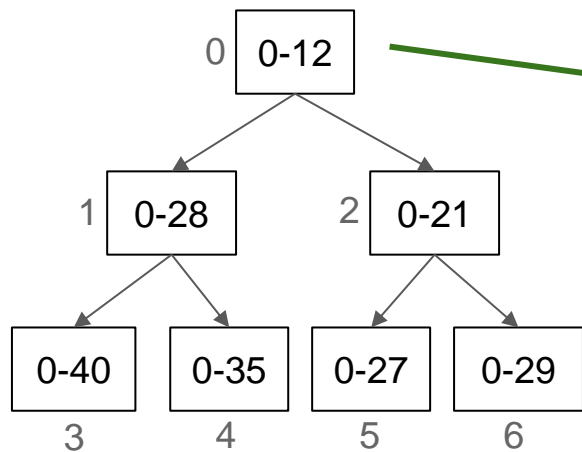
5	6	7	10	11
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Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12
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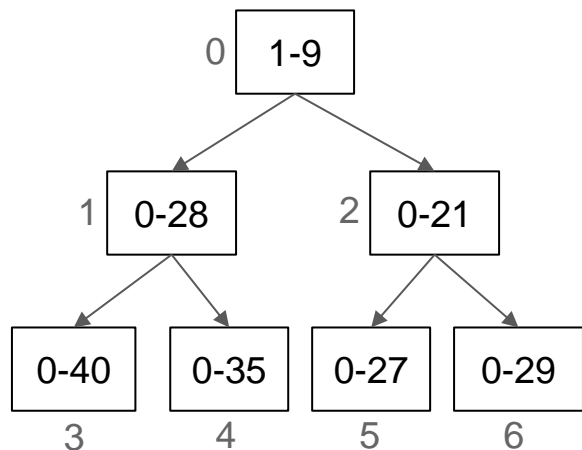
Arq 2:





0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

**Criação de um novo número de segmento ordenado (1)**



**Saídas:**

Arq 1:

5	6	7	10	11	12
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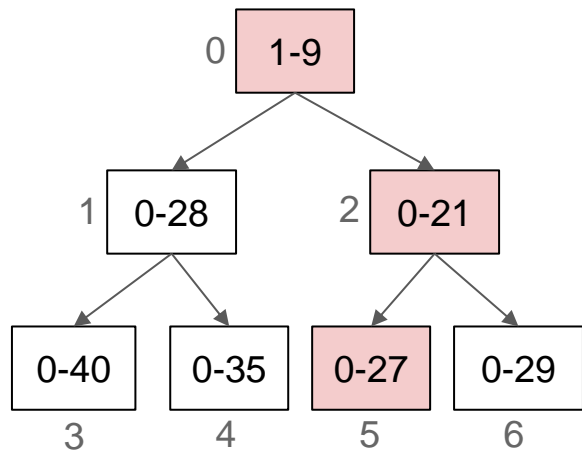
Arq 2:



**9 < 12**  
Se ele entrar aqui, o segmento ordenado é finalizado

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

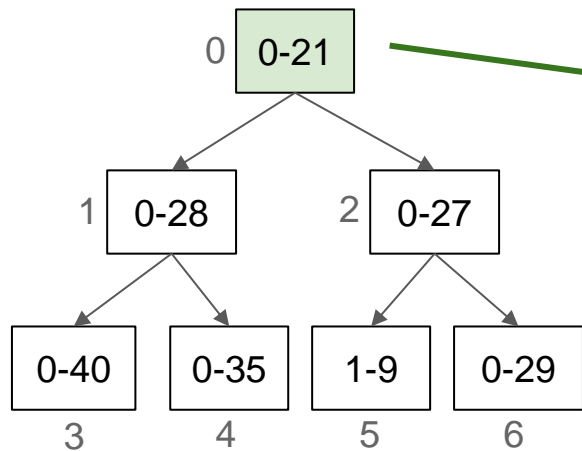
5	6	7	10	11	12
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Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



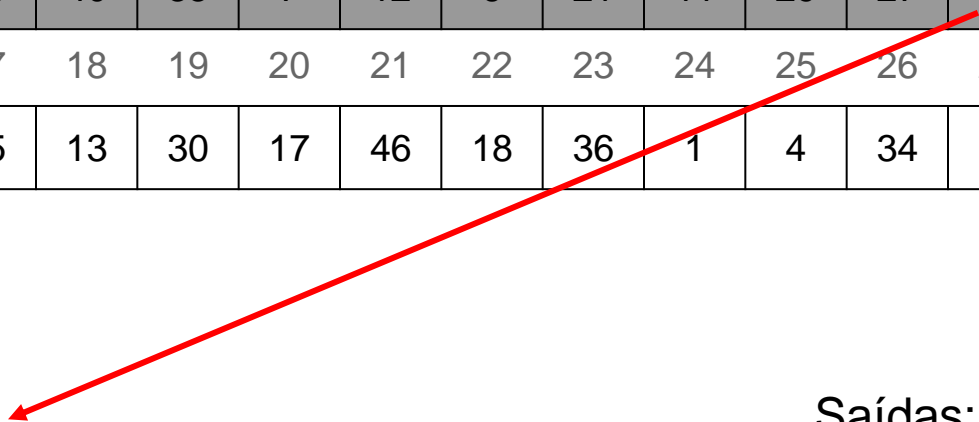
Arq 1:

5	6	7	10	11	12	21
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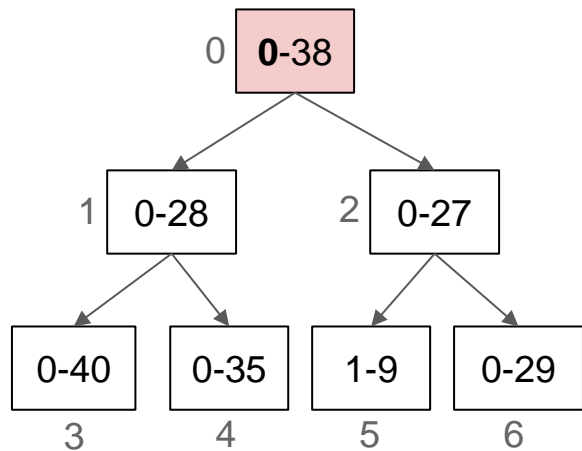
Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22



Saídas:



Arq 1:

5	6	7	10	11	12	21
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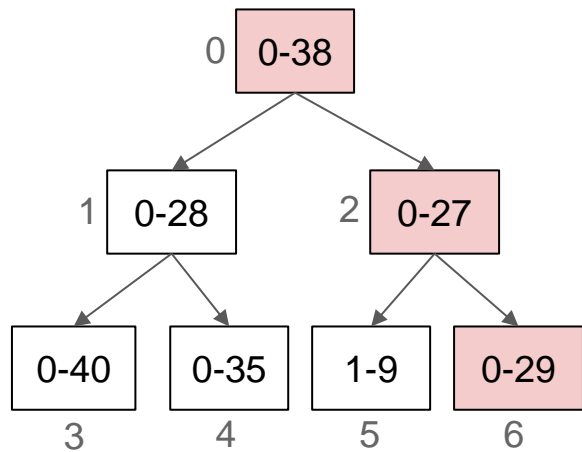
Arq 2:



38 > 21  
Ele pode entrar aqui  
sem quebrar a  
ordenação do segmento

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

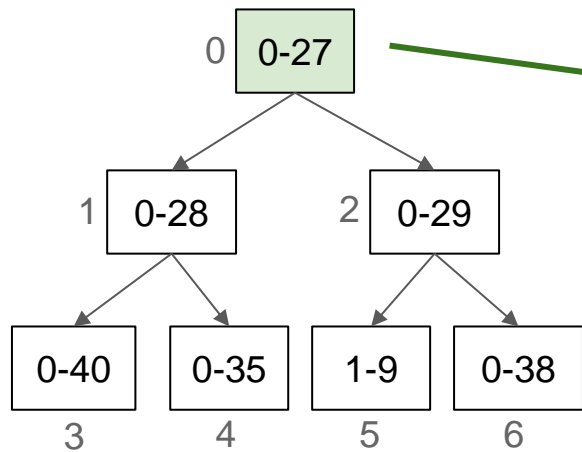
5	6	7	10	11	12	21
---	---	---	----	----	----	----

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

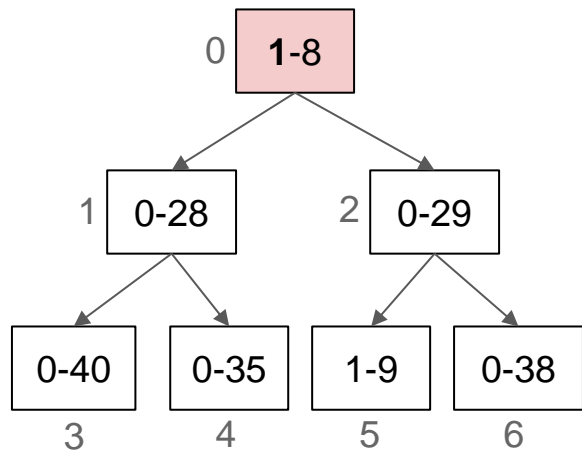
5	6	7	10	11	12	21	27
---	---	---	----	----	----	----	----

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27
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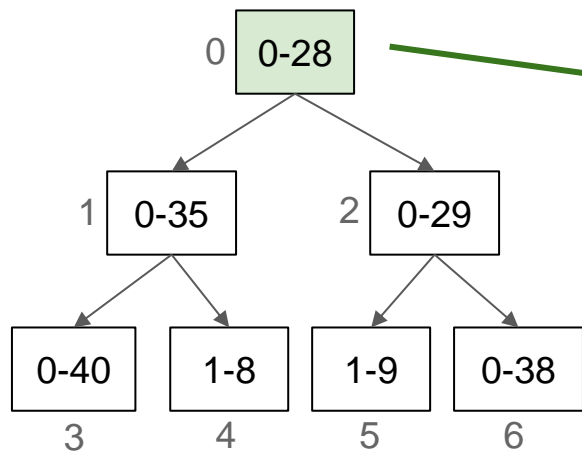
Arq 2:



$8 < 27$   
Se ele entrar aqui, o  
segmento ordenado é  
finalizado

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28
---	---	---	----	----	----	----	----	----

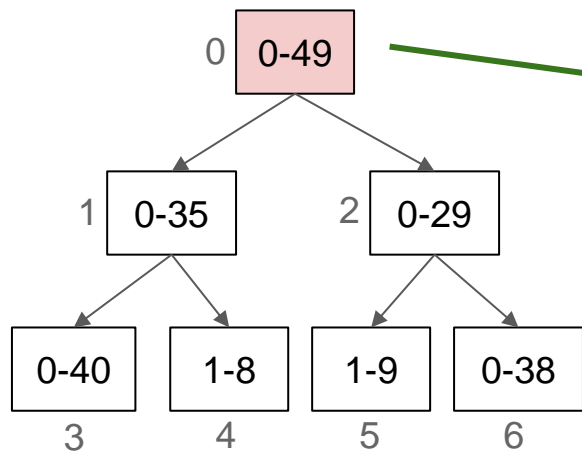
Arq 2:





0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

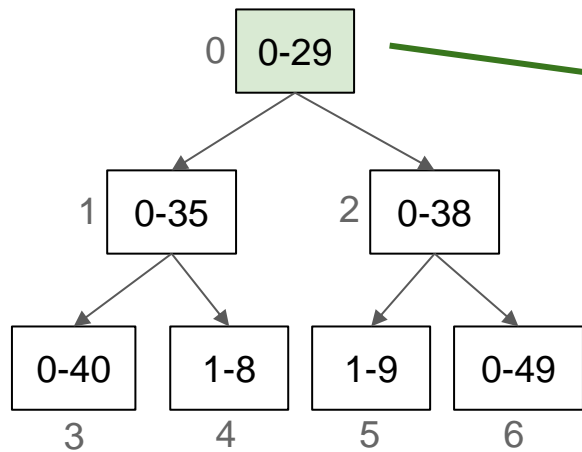
5	6	7	10	11	12	21	27	28
---	---	---	----	----	----	----	----	----

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

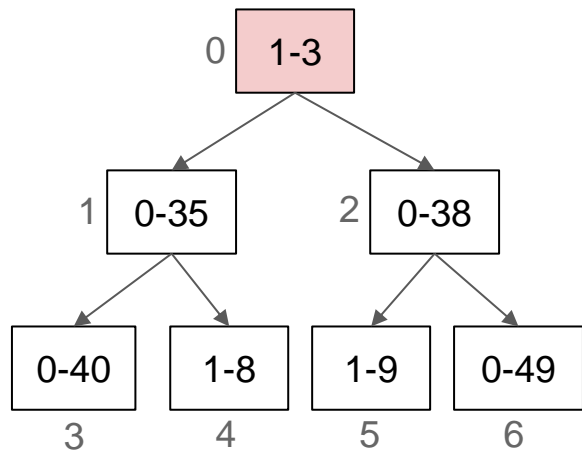
5	6	7	10	11	12	21	27	28	29
---	---	---	----	----	----	----	----	----	----

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

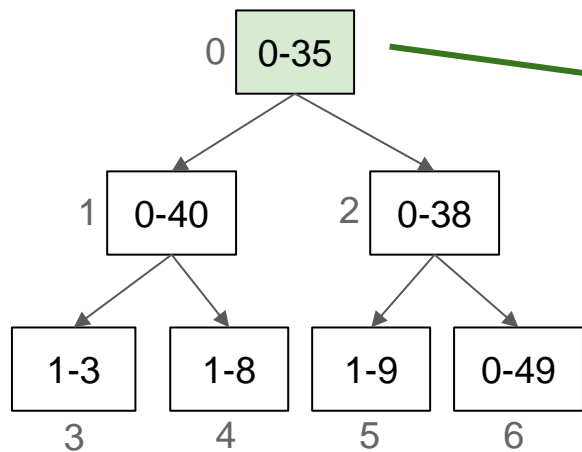
5	6	7	10	11	12	21	27	28	29
---	---	---	----	----	----	----	----	----	----

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

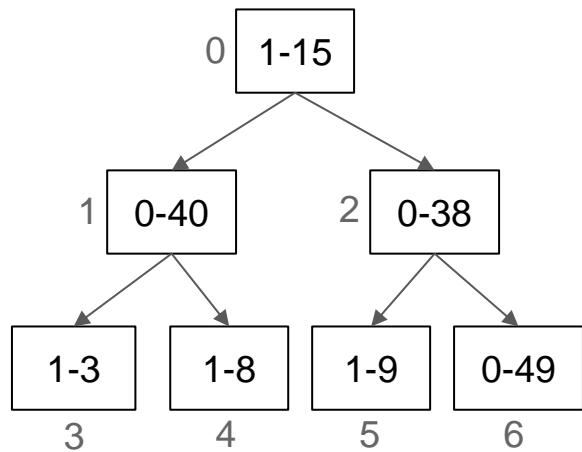
5	6	7	10	11	12	21	27	28	29
35									

Arq 2:

--

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

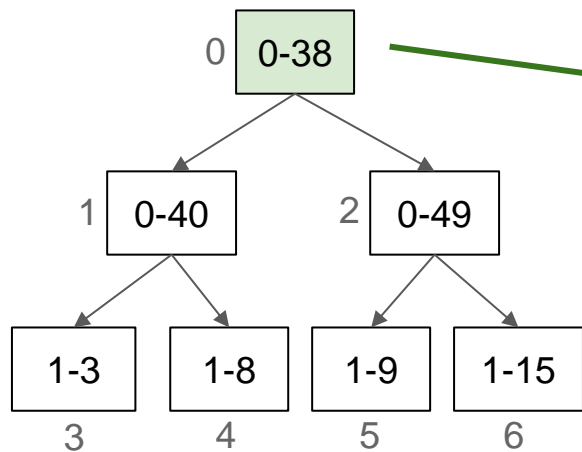
5	6	7	10	11	12	21	27	28	29
35									

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

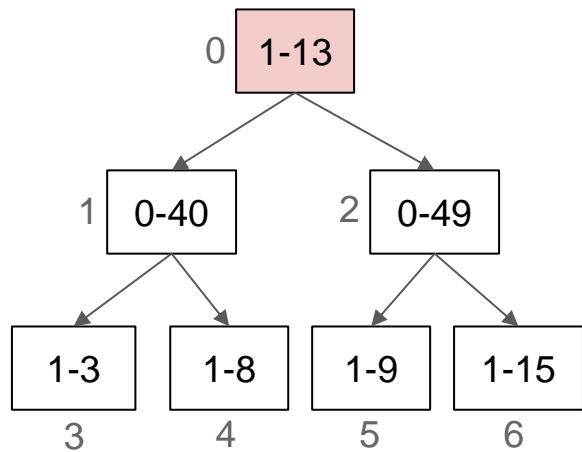
5	6	7	10	11	12	21	27	28	29
35	38								

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

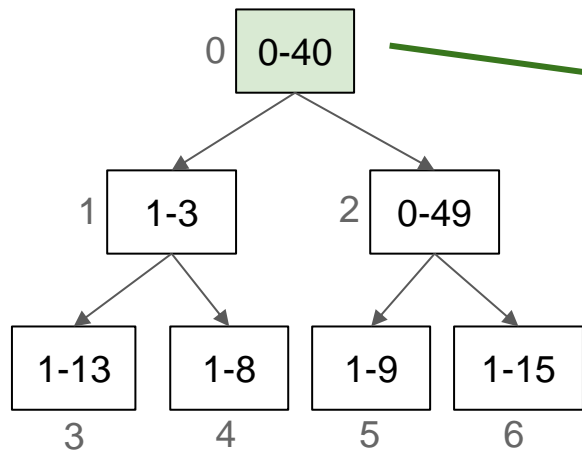
5	6	7	10	11	12	21	27	28	29
35	38								

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40							

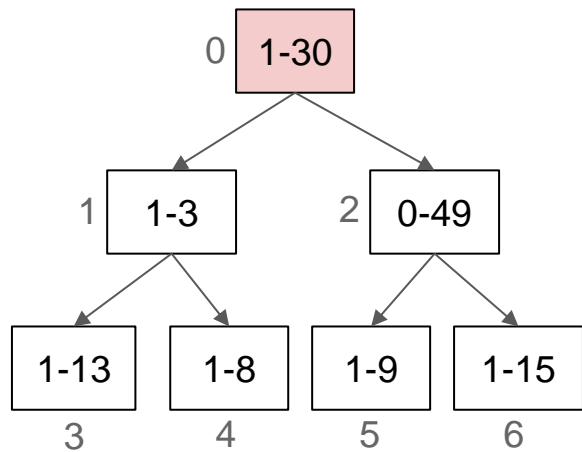
Arq 2:





0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

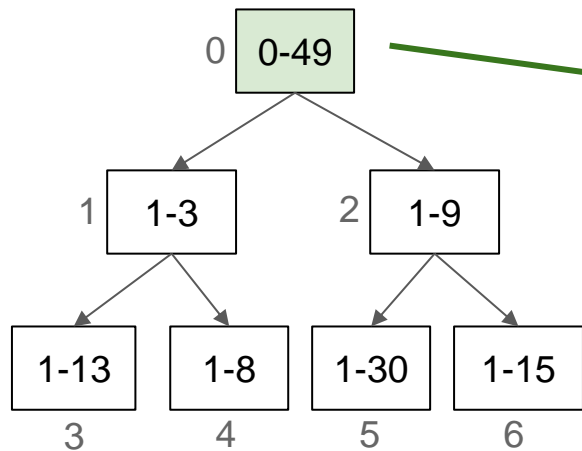
5	6	7	10	11	12	21	27	28	29
35	38	40							

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

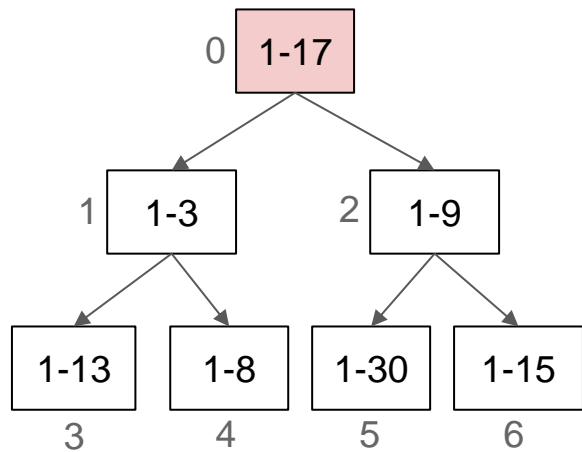
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49						

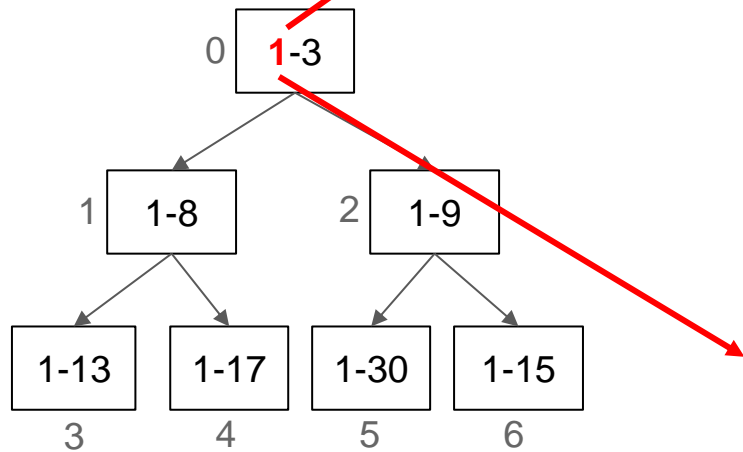
Arq 2:



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

**NOVO SEGMENTO**

Saídas:



Arq 1:

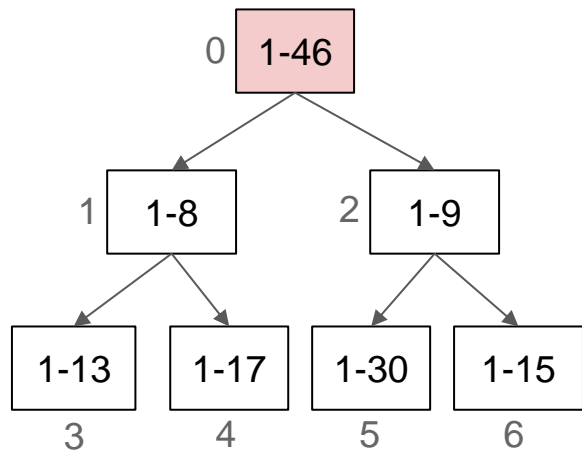
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3
---

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

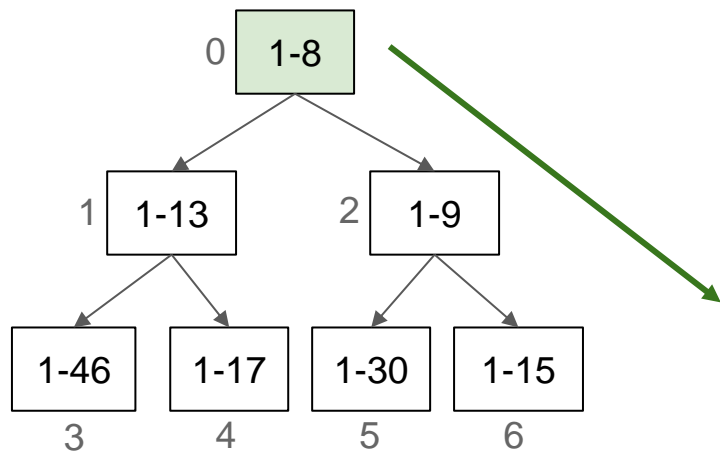
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3
---

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

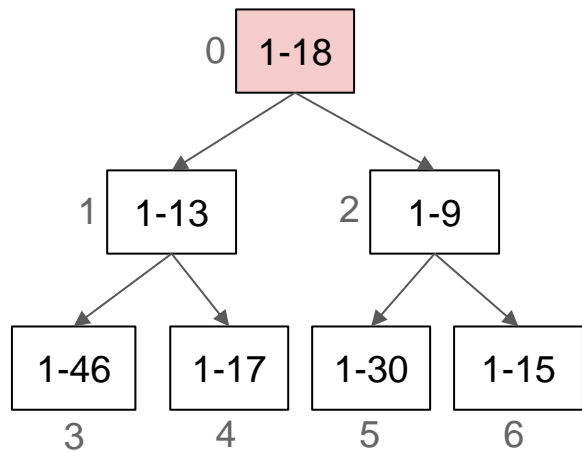
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8
---	---

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

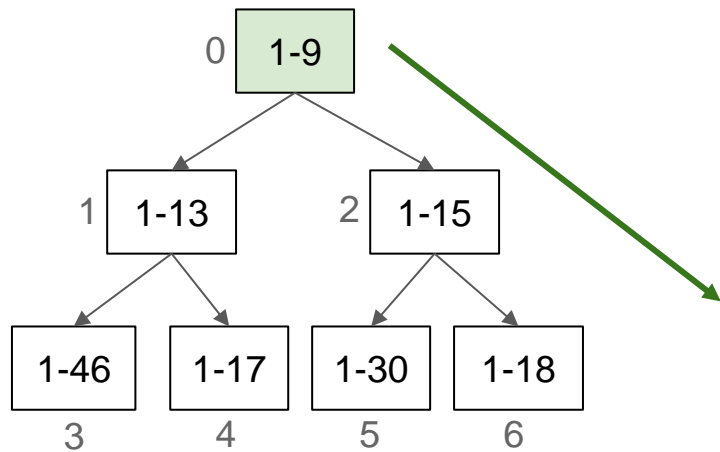
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8
---	---

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49						

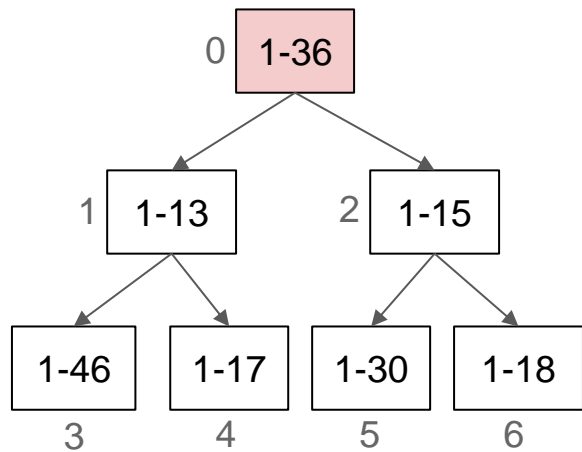
Arq 2:

3	8	9
---	---	---



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

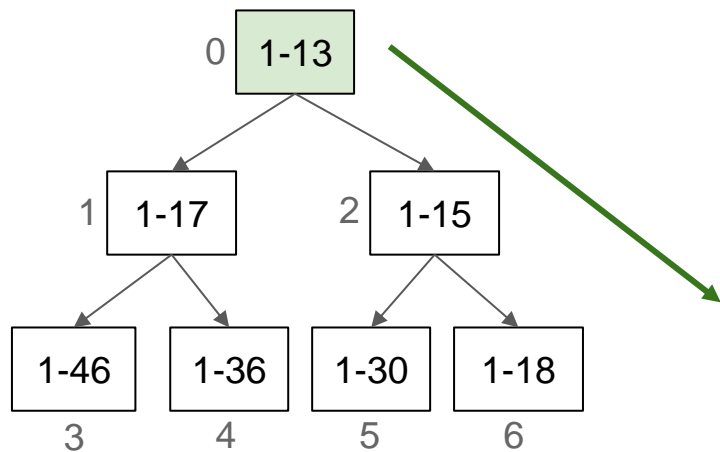
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9
---	---	---

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

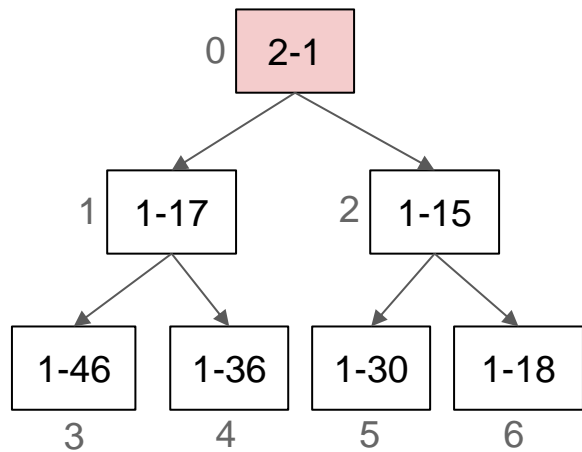
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13
---	---	---	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

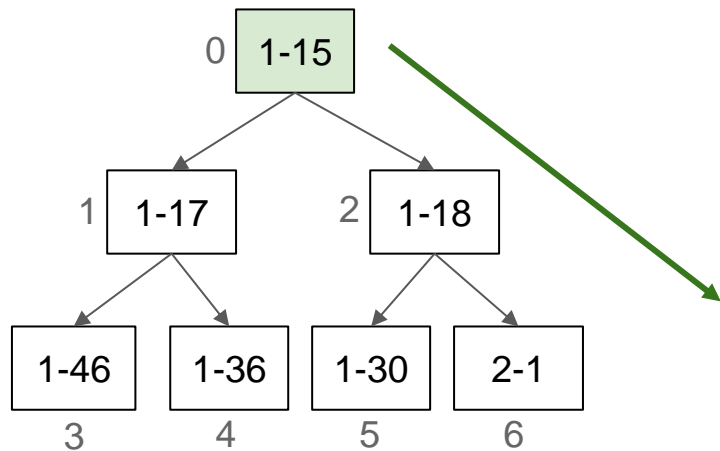
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13
---	---	---	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

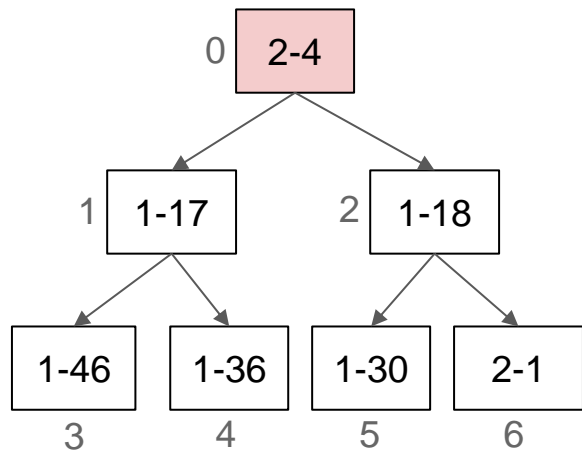
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15
---	---	---	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

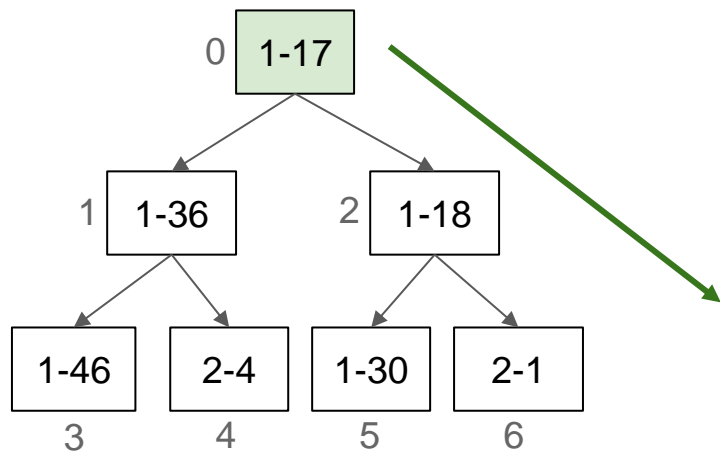
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15
---	---	---	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

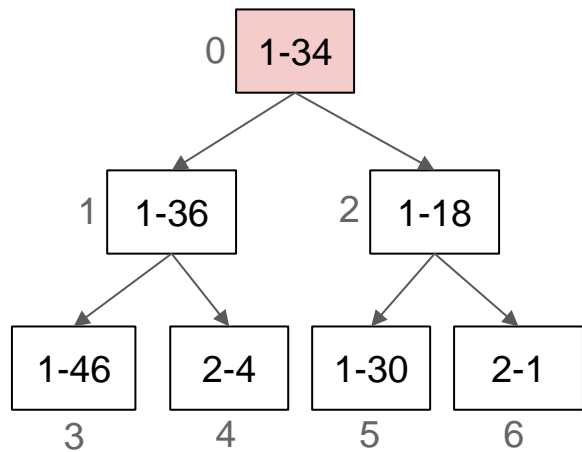
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17
---	---	---	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

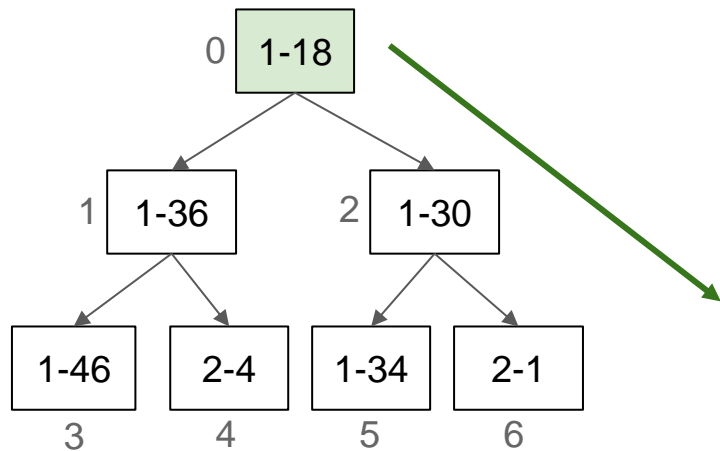
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17
---	---	---	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49						

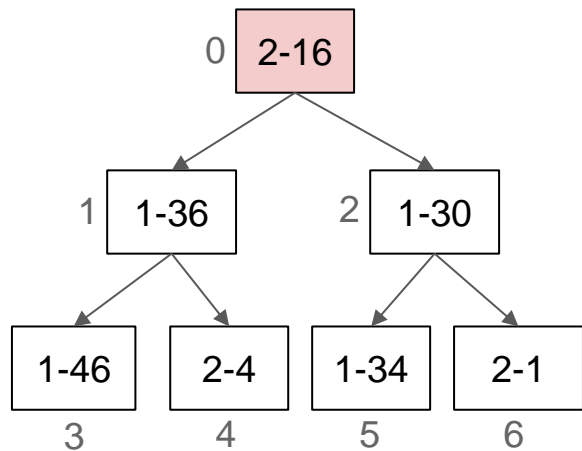
Arq 2:

3	8	9	13	15	17	18
---	---	---	----	----	----	----



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

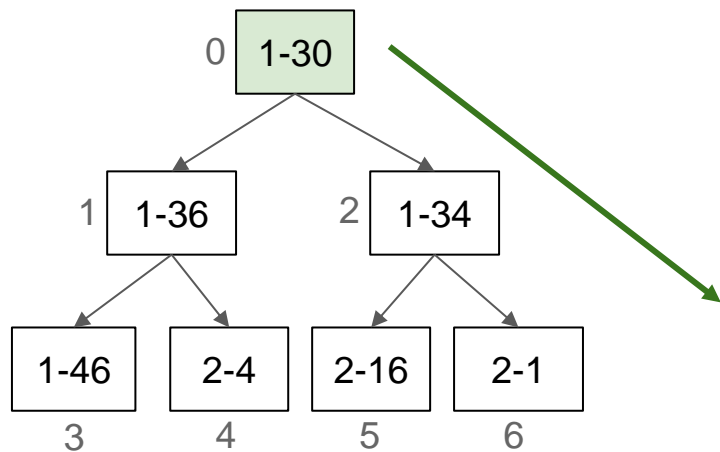
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18
---	---	---	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

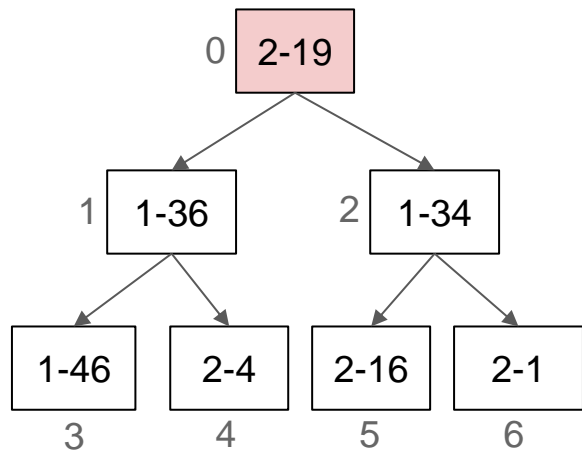
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30
---	---	---	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

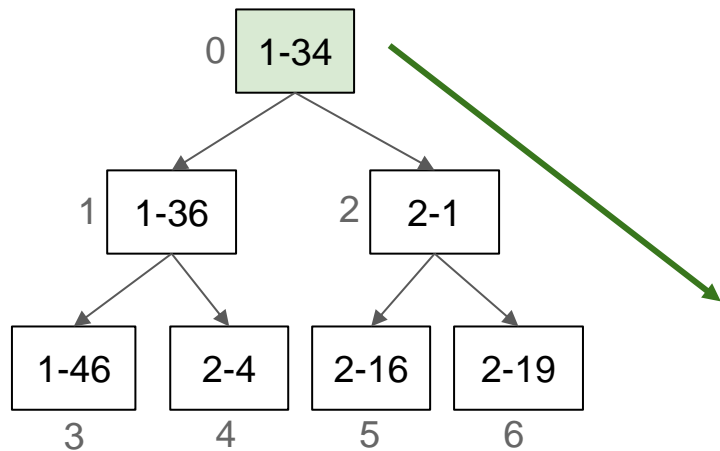
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30
---	---	---	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

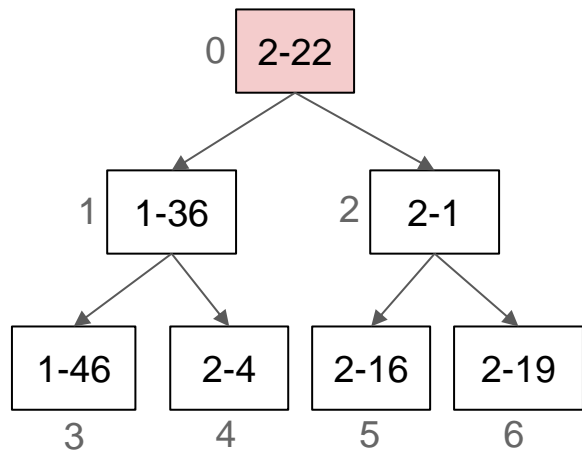
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30	34
---	---	---	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

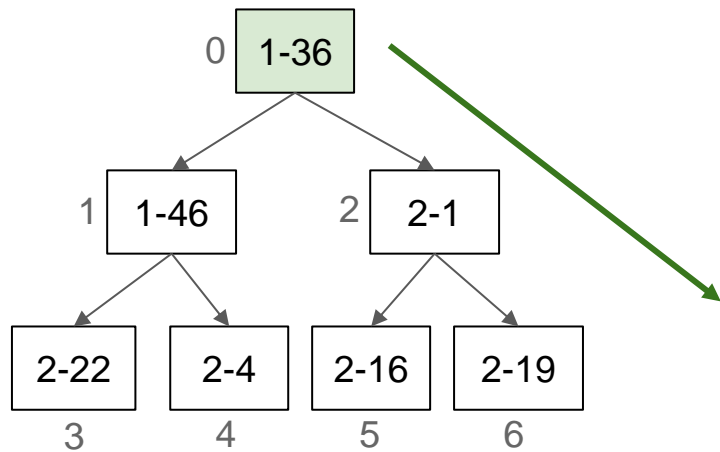
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30	34
---	---	---	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

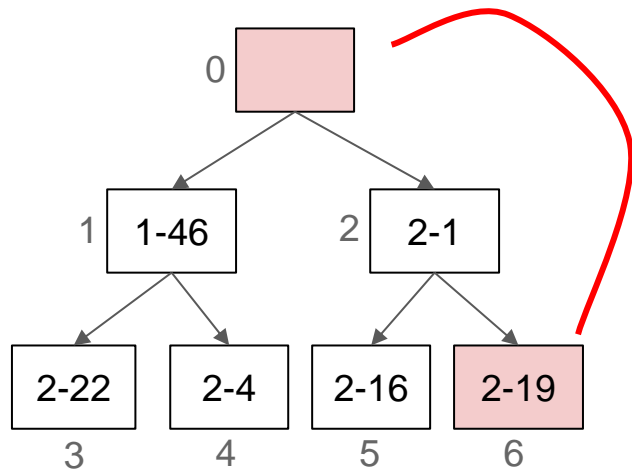
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30	34	36
---	---	---	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

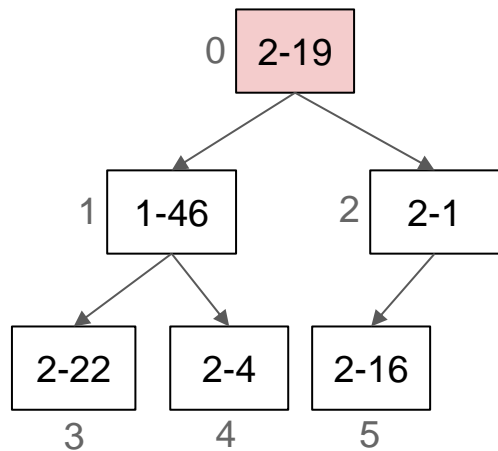
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30	34	36
---	---	---	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49						

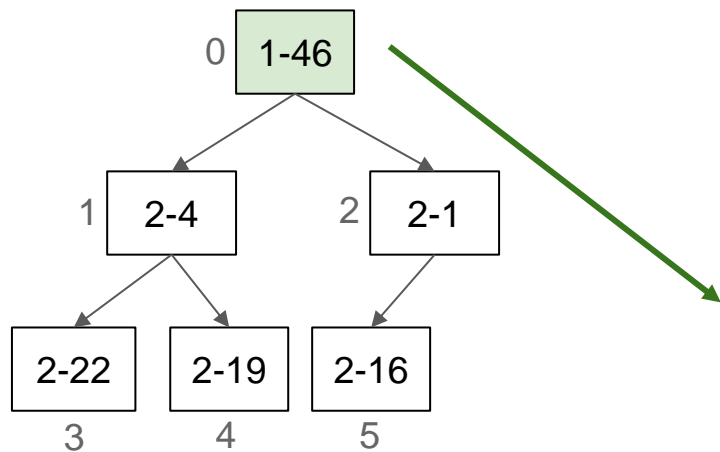
Arq 2:

3	8	9	13	15	17	18	30	34	36
---	---	---	----	----	----	----	----	----	----



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

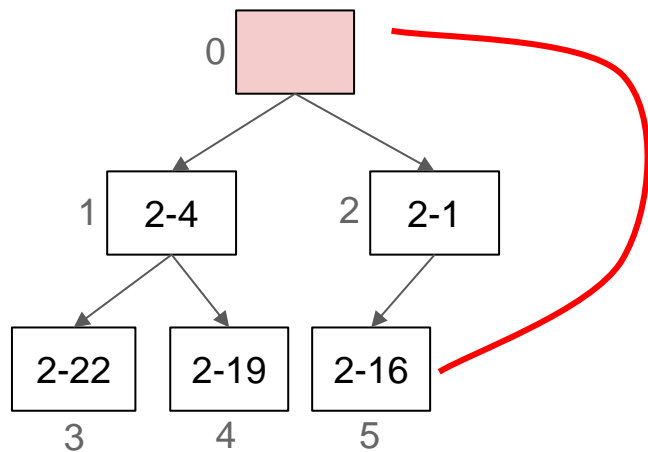
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

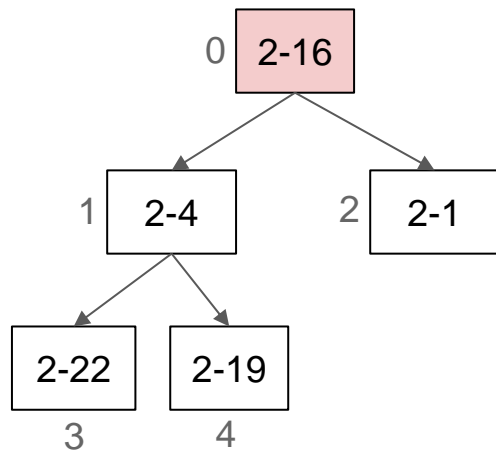
5	6	7	10	11	12	21	27	28	29
35	38	40	49						

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49						

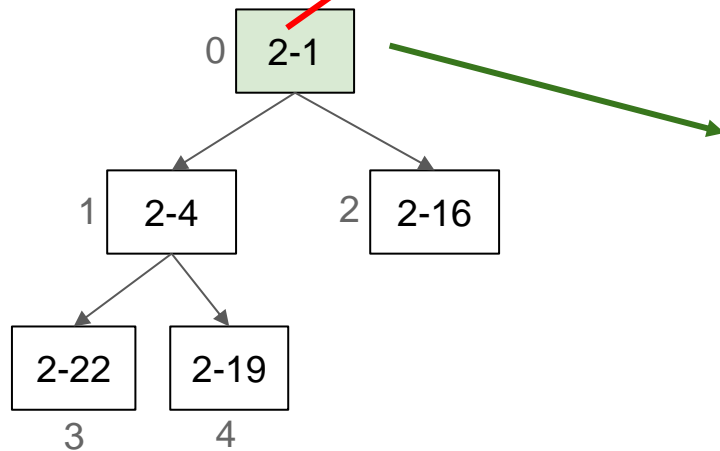
Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

**NOVO SEGMENTO**

Saídas:



Arq 1:

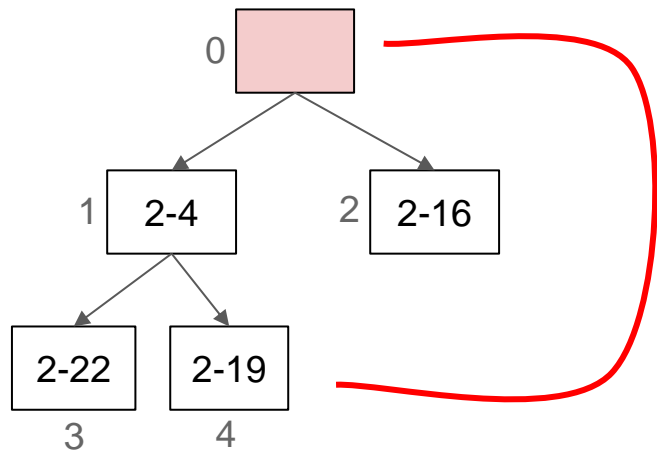
5	6	7	10	11	12	21	27	28	29
35	38	40	49	1					

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

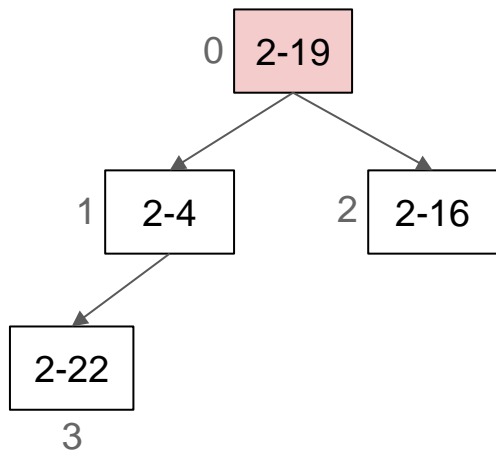
5	6	7	10	11	12	21	27	28	29
35	38	40	49	1					

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

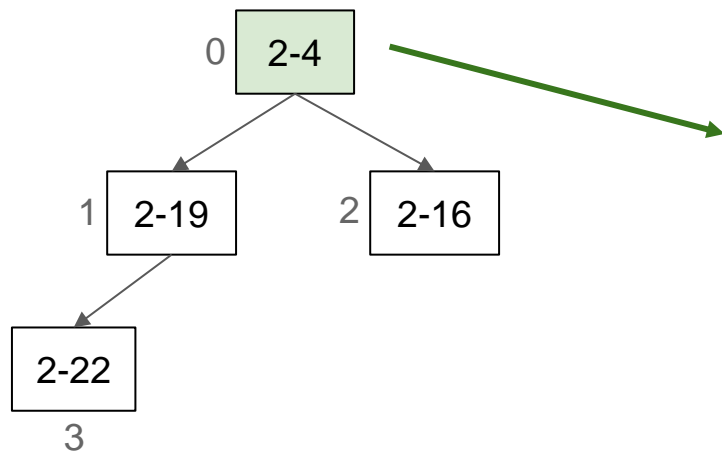
5	6	7	10	11	12	21	27	28	29
35	38	40	49	1					

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

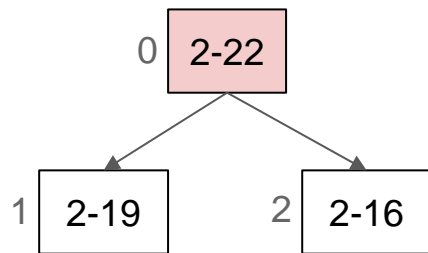
5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4				

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4				

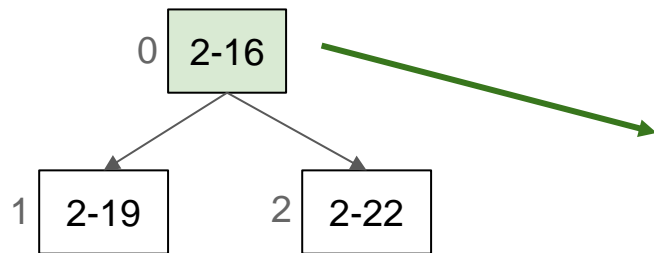
Arq 2:

3	8	9	13	15	17	18	30	34	36	46
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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

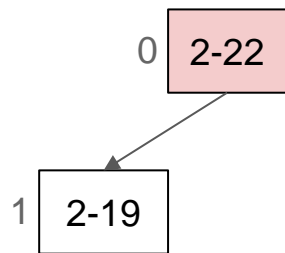
5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4	16			

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

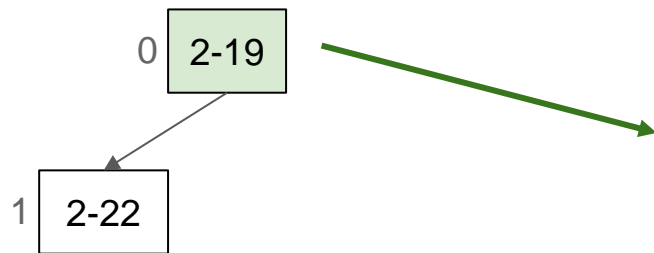
5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4	16			

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4	16	19		

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Saídas:

0 2-22



Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4	16	19	22	

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
---	---	---	----	----	----	----	----	----	----	----

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	28	10	40	35	7	12	6	21	11	29	27	9	38	8
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
49	3	15	13	30	17	46	18	36	1	4	34	16	19	22

Agora é só fazer as intercalações!!!

Saídas:

Arq 1:

5	6	7	10	11	12	21	27	28	29
35	38	40	49	1	4	16	19	22	

Arq 2:

3	8	9	13	15	17	18	30	34	36	46
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