Longest Growing / Common Huffman

Seminar 10.

It's Hoffman, babe

Definition

- Alphabet of **symbols** $A = \{a_1, \ldots, a_n\}$
- Each symbol's **weight** $W = \{w_1, \ldots, w_n\}$
- Each symbol's binary **code** $C = \{c_1, \ldots, c_n\}$

It's Hoffman, babe
algo

'ABRACADABRA' $\longrightarrow$ Alphabet A = {A,B,R,C,D}

equals to the number of repetitions in text

Weights W = {5,2,2,1,1}

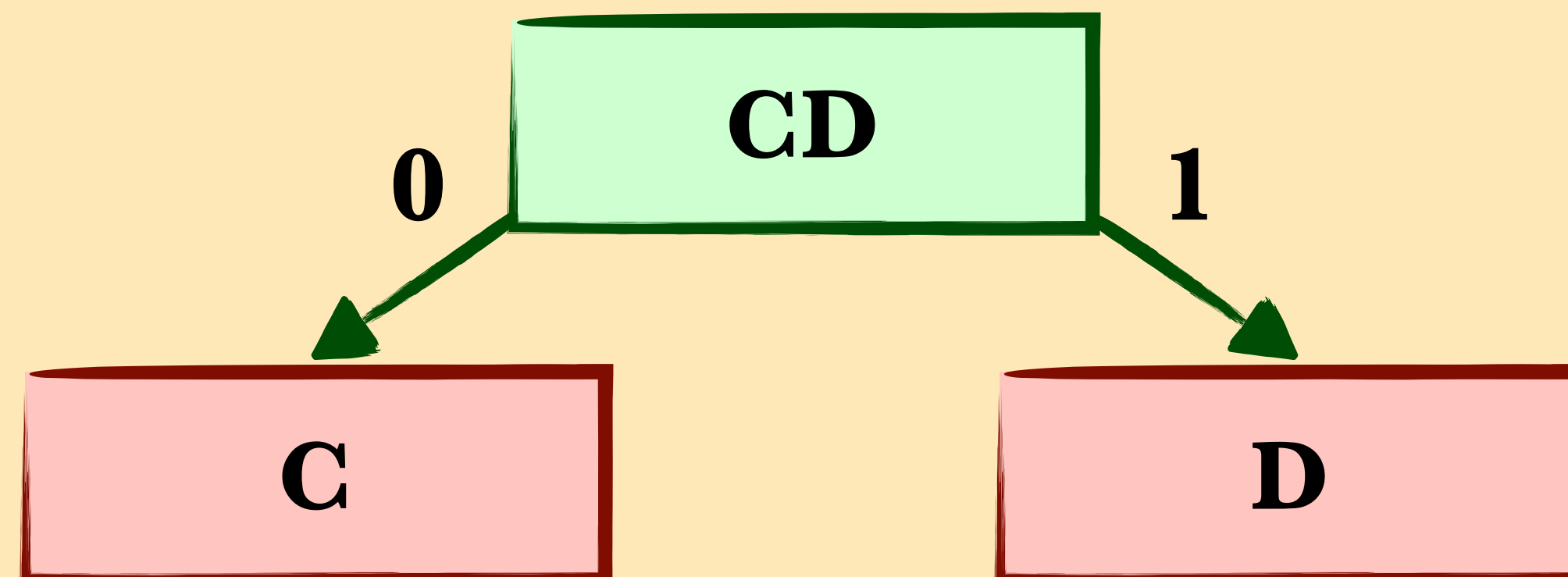# It's Hoffman, babe
algo

$\{A,B,R,\mathbf{C},\mathbf{D}\}$
$\{5, 2,2, \mathbf{1}, \mathbf{1}\}$

C	D

It's Hoffman, babe
algo

$\{A, B, R, \mathbf{CD}\}$
$\{5, \ 2, 2, \ \ \mathbf{2}\}$

It's Hoffman, babe
algo

$\{A, B, \textbf{RCD}\}$
$\{5, 2, \quad \textbf{4}\}$
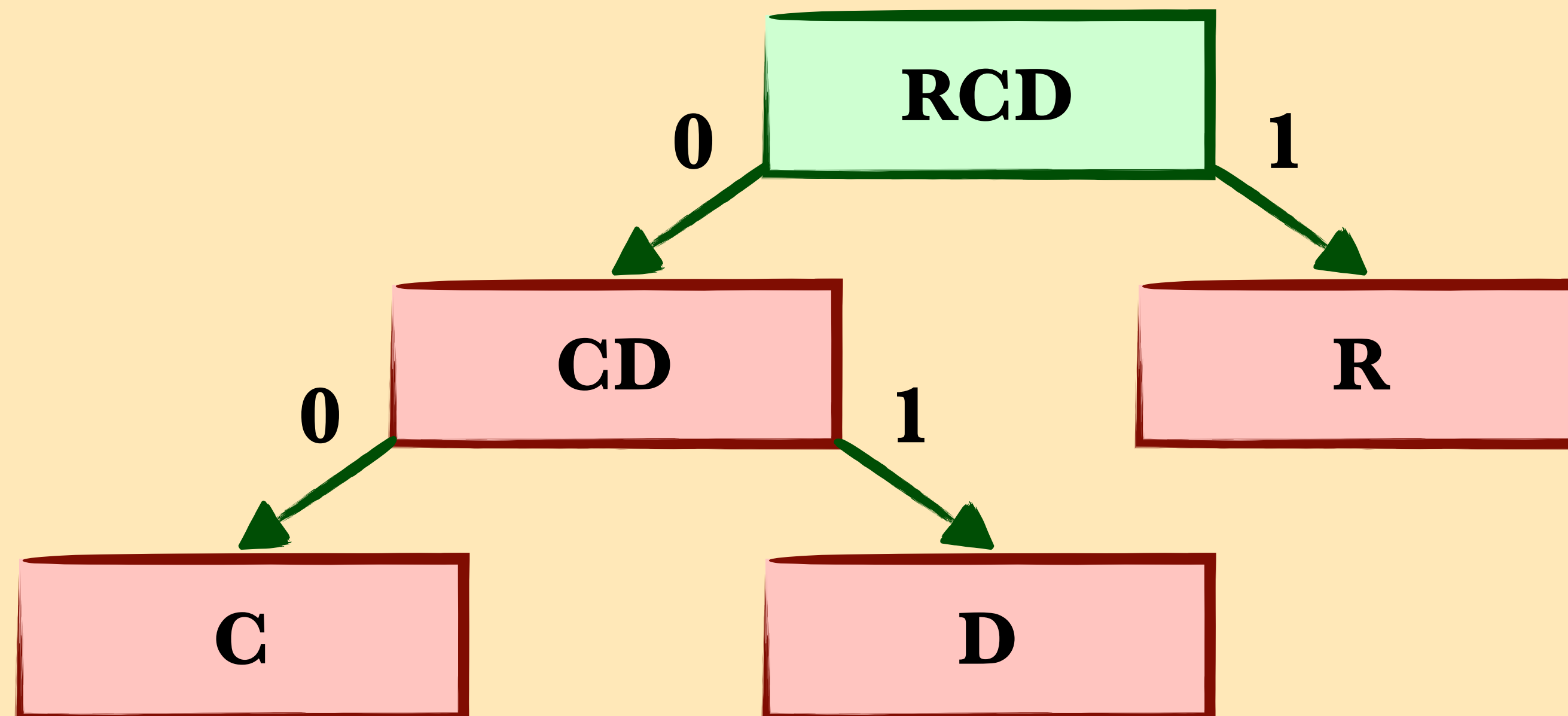
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algo

$\{A, \mathbf{BRCD}\}$
$\{5, \quad \mathbf{6}\}$
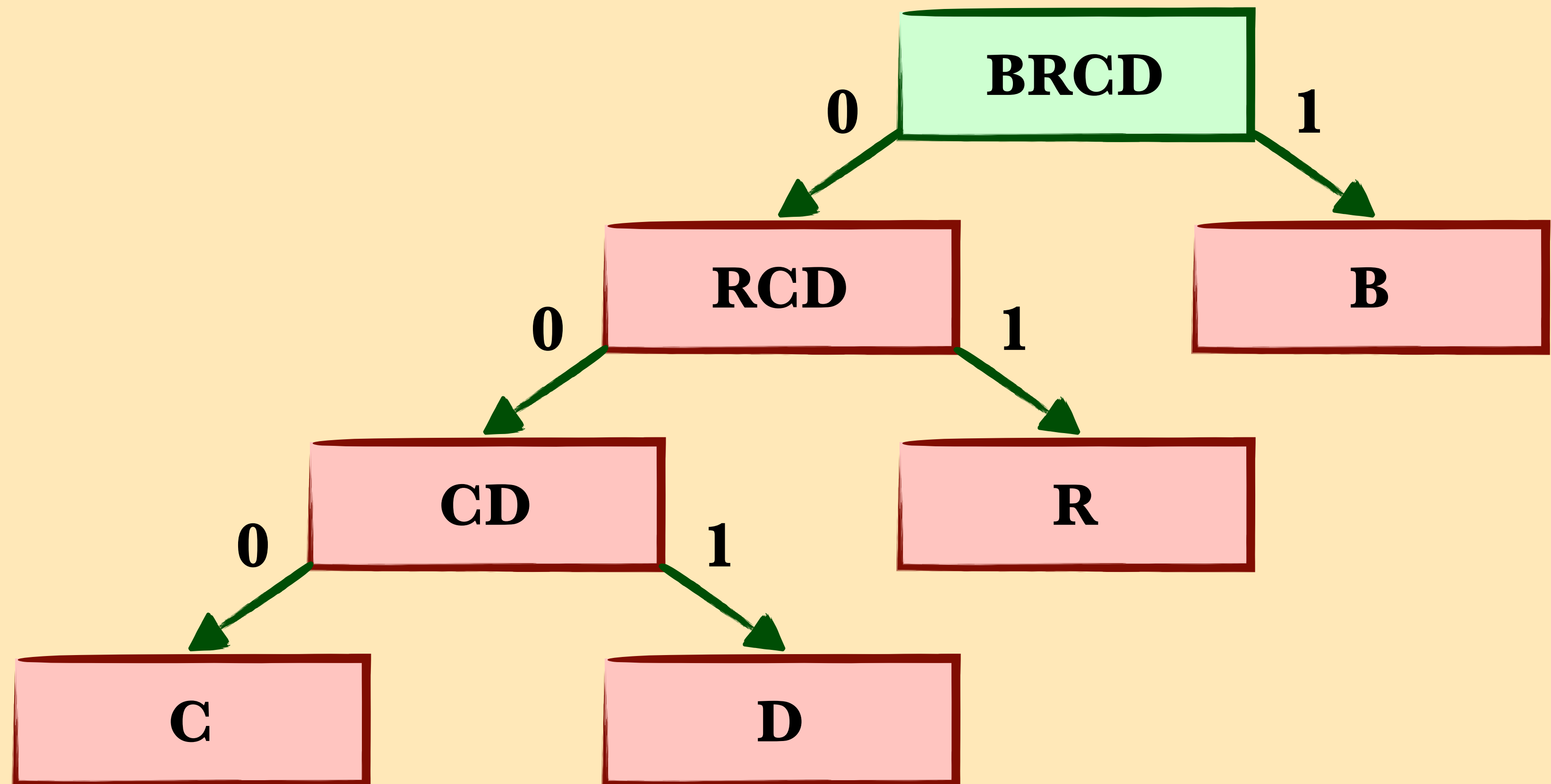
It's Hoffman, babe

algo

{ABRCD}
{11}

Greatest growing sequence
algo

Empty array d ⟶ Calculate $d[i]$ after filling $d[i-1]$

l o n g e s t
growing seq,
ending at i

Add to the
greatest
existing seq

New seq of
unit length

$$d[i] = \max(1, \max_{j \in [0,i);\ a[j]<a[i]} (d[j] + 1))$$
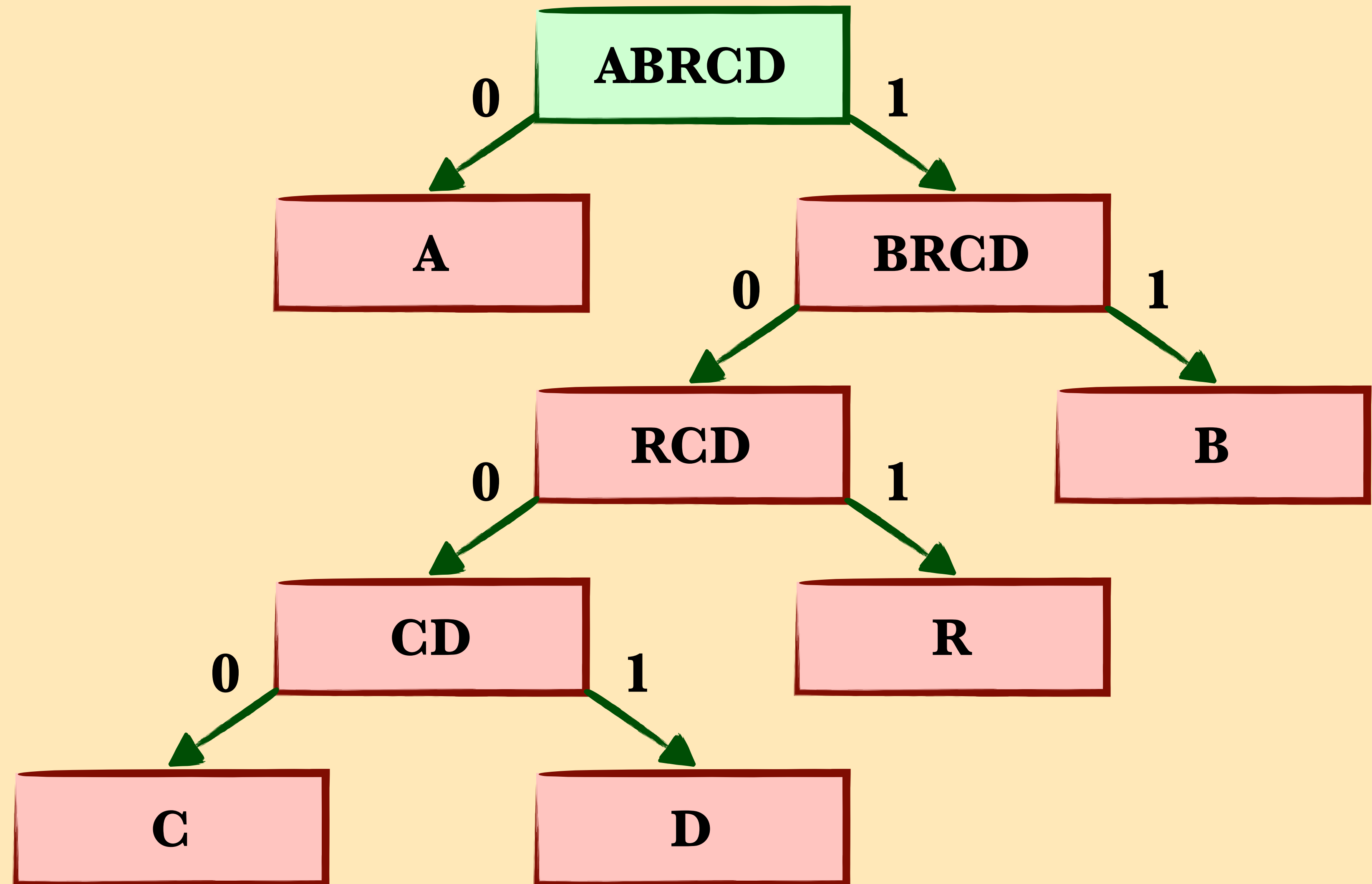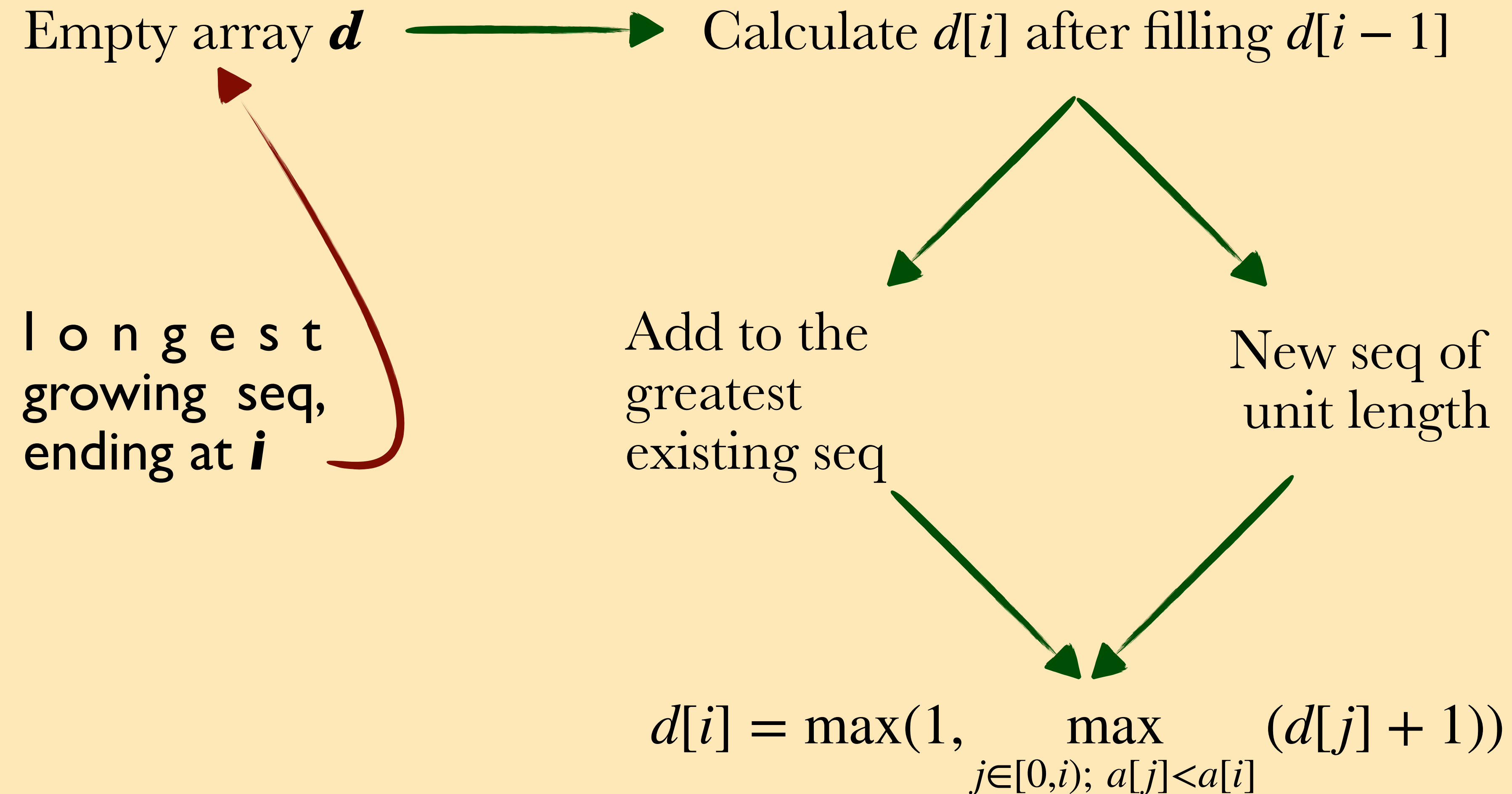
Greatest growing sequence
getting the seq
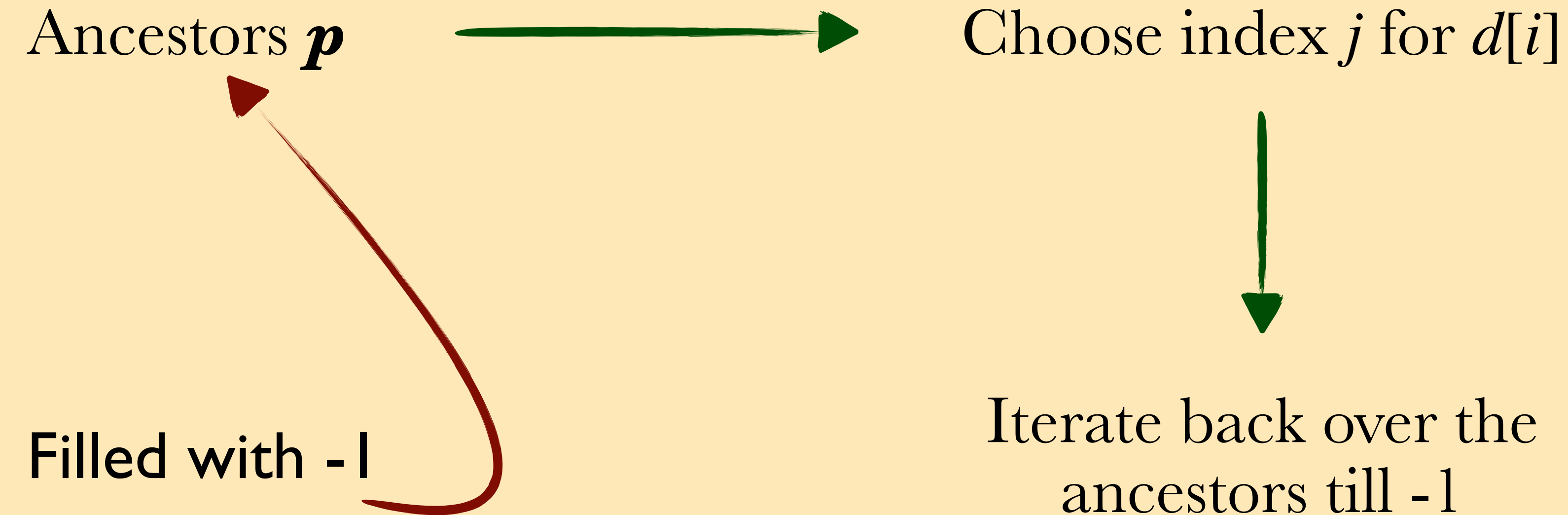
Ancestors p → Choose index j for $d[i]$

Filled with -1

Iterate back over the ancestors till -1

Greatest growing sequence

nlogn algo

Array a	1	4	7	9	11	3	2	5	10	8	3
Values d	1										

Greatest growing sequence

nlogn algo

Array a	1	4	7	9	11	3	2	5	10	8	3
Values d	1	4	7	9	11						

Greatest growing sequence

nlogn algo

Array a	1	4	7	9	11	3	2	5	10	8	3

Values d	1	3	7	9	11						

Greatest growing sequence

nlogn algo

Array a	1	4	7	9	11	3	2	5	10	14	3
Values d	1	2	5	9	10	14					

Greatest common sequence

		H	A	R	B	O	U	R
	0	0	0	0	0	0	0	0
H	0	1	1	1	1	1	1	1
A	0	1	2	2	2	2	2	2
B	0	1	2	2	3	3	3	3
R	0	1	2	3	3	3	3	4
A	0	1	2	3	3	3	3	4
H	0	1	2	3	3	3	3	4
A	0	1	2	3	3	3	3	4
B	0	1	2	3	4	4	4	4
R	0	1	2	3	4	4	4	5