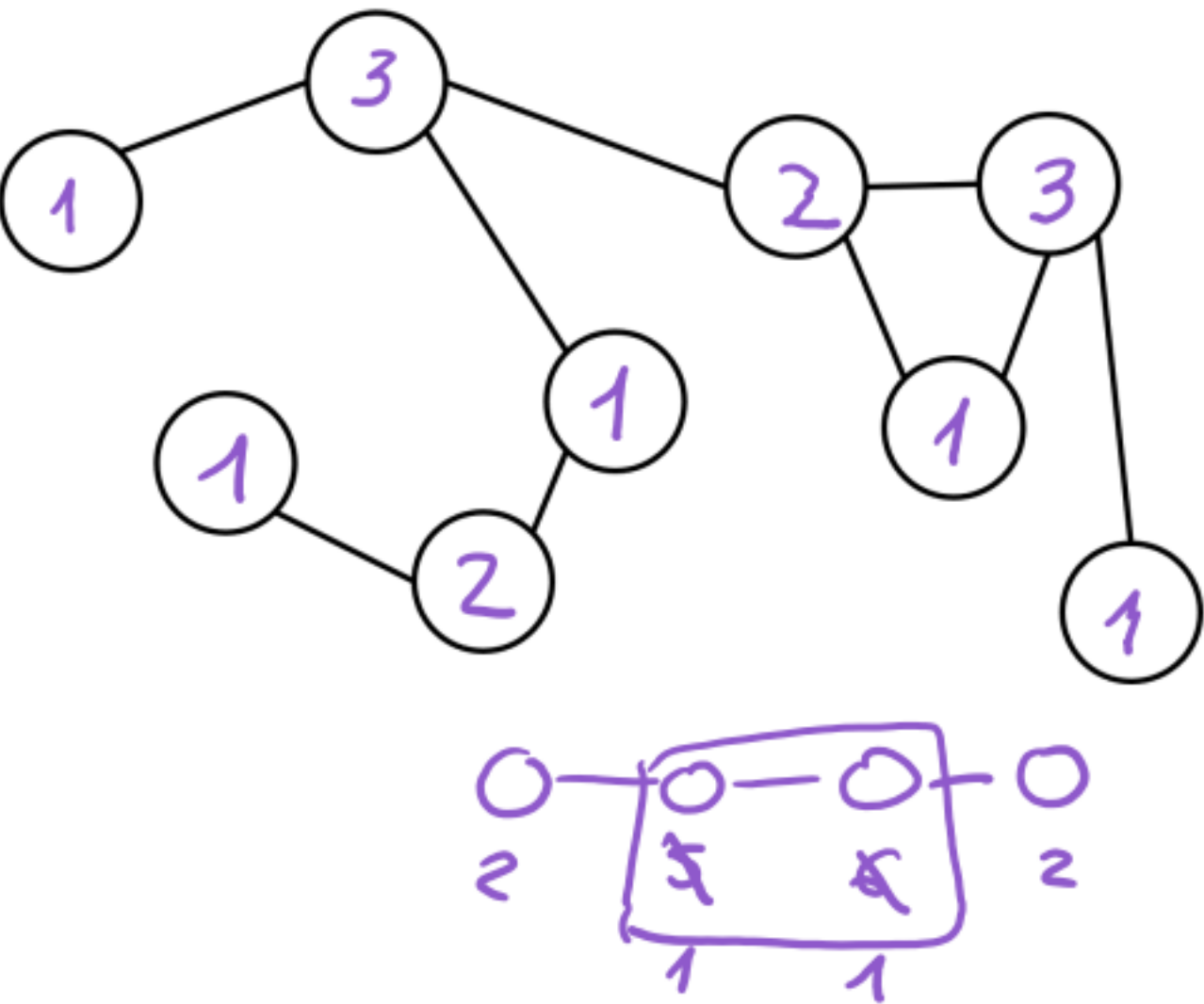


Reduce



Analysis: Reduce

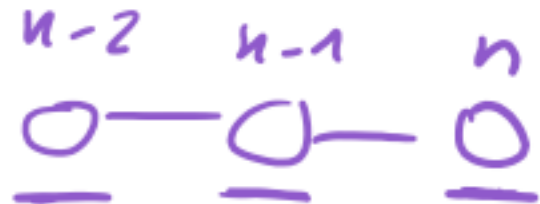
Approximation quality: # colors?

$$\frac{\Delta + 1}{\chi}$$



Time complexity: # rounds?

$$O(n)$$



Message complexity: # messages?

$$n \cdot \Delta \cdot n$$

rounds msg/node nodes

Local complexity: local computations?

$$O(\Delta)$$

Analysis: Slow tree coloring

Correctness

proper coloring: children make sure that they have a different color from parents

2 coloring corresponds to layers in the tree



Time complexity: # rounds?



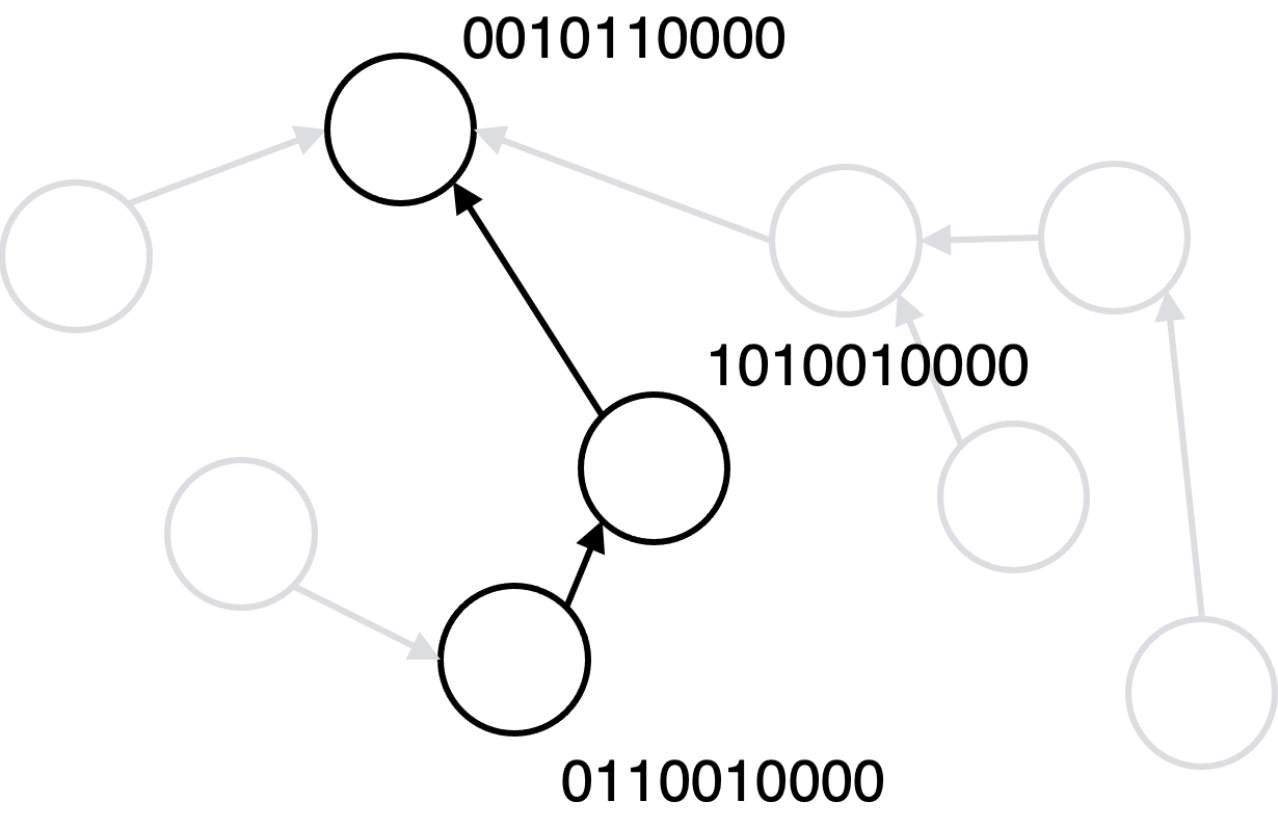
$$\log n$$



$$\text{depth} \approx \text{Diameter} :$$

$$\max \left(\begin{array}{l} \text{min distance} \\ \text{between any} \\ \text{pair of nodes} \end{array} \right)$$

Example: Fast tree coloring reduction



c_v	c_p	i	b	$2i + b$
root 0010110000	0000000000	4	1	9
1010010000	0010110000	5	0	10
0110010000	1010010000	8	1	17
2^x		x		$2x + 1$

Analysis: Fast tree coloring reduction

Correctness - is the coloring proper?

000111 — parent: different i $2 \cdot i_p \neq 2 \cdot i_c$
001011 — child:
101101 — same $i \rightarrow$ different b

000111
001011
101101

Time complexity - 2x colors in one round? at start: 2^x

highest ID: $2(x-1) + b$

Example: Shift down

