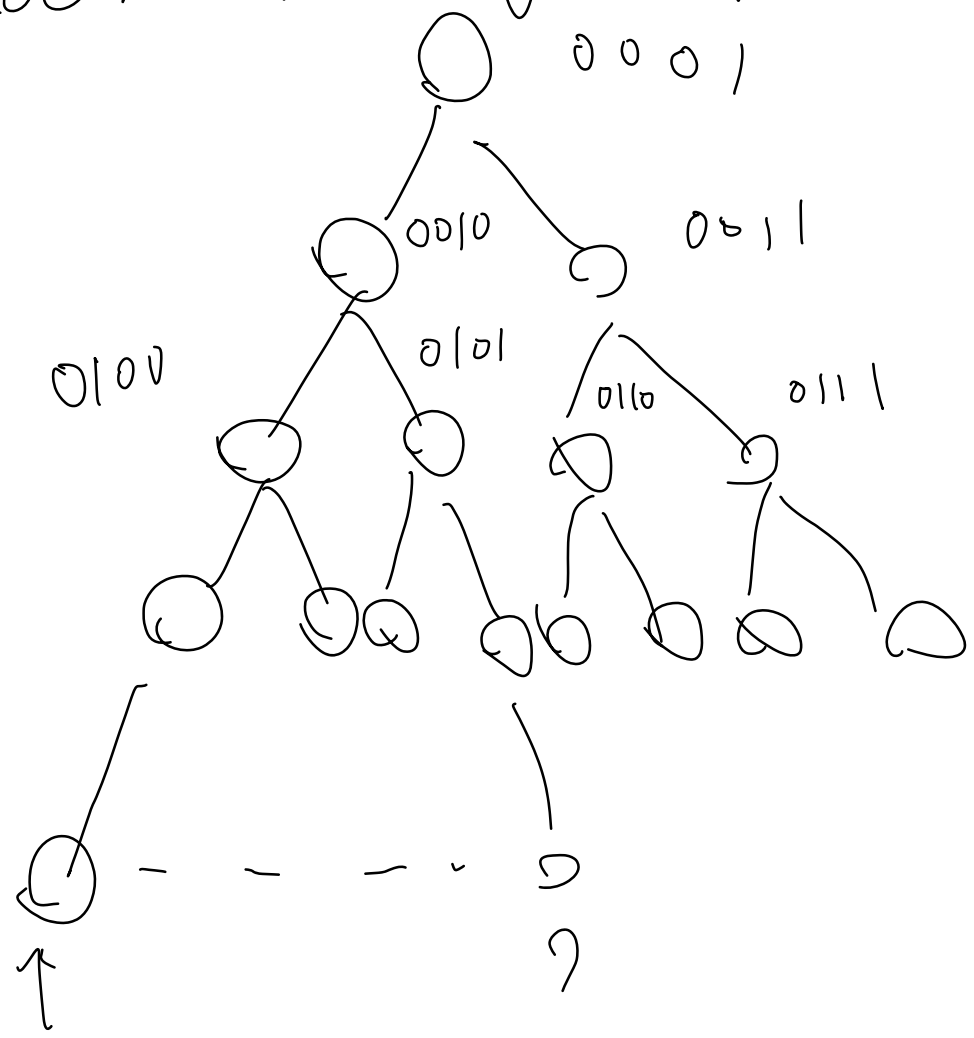
Let h = the height of this tree



Can know depth in O(h) time

← How can I know this position efficiently?

⇒ Use a binary search

$O(\log^2 n)$

$$\lim_{n\to\infty} \frac{\log^2 n}{n}$$

$$= \lim_{n\to\infty} \frac{2\log n \cdot \frac{1}{n}}{1}$$

$$= \lim_{n\to\infty} 2 \cdot \frac{\log n}{n}$$

$$= 0$$

$$\Rightarrow O(\log^2 n) < O(n)$$