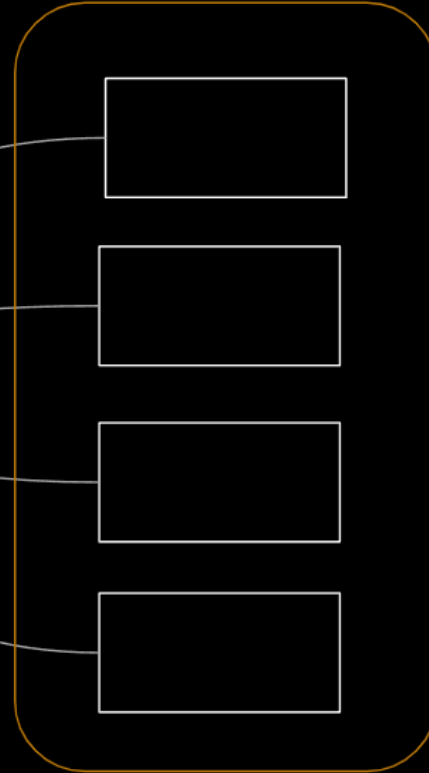


buckets

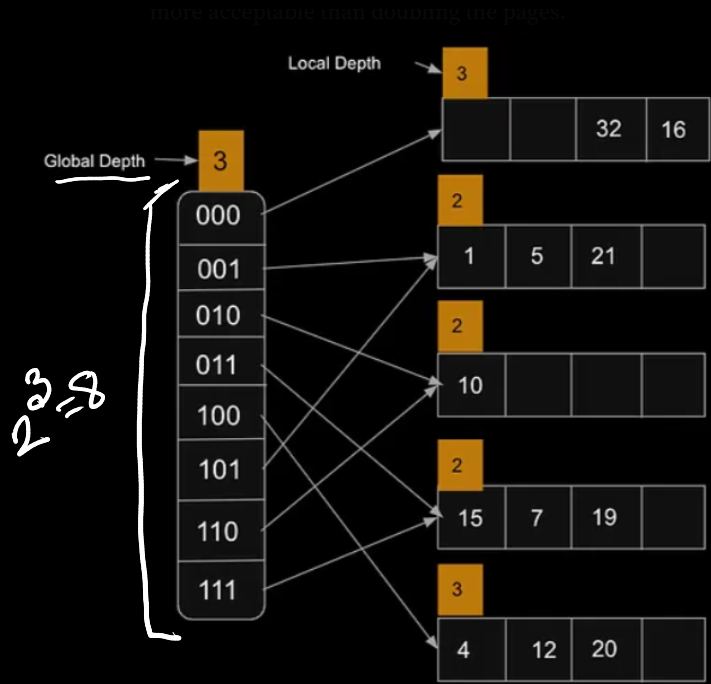
Directory /
Hash Table

00
01
10
11



The number of directory entries is equal to $2^{\text{global depth}}$, and the initial number of buckets is equal to $2^{\text{local depth}}$.

Thus if global depth = local depth = 0, then $2^0 = 1$, so an initial directory of one pointer to one bucket.



Directory

Data Pages

bucket, it can be merged with its split image and decrease the local depth.
And if each directory pointer and its split image points to the same bucket,
the bucket can be merged with its split image and decrease the global depth.

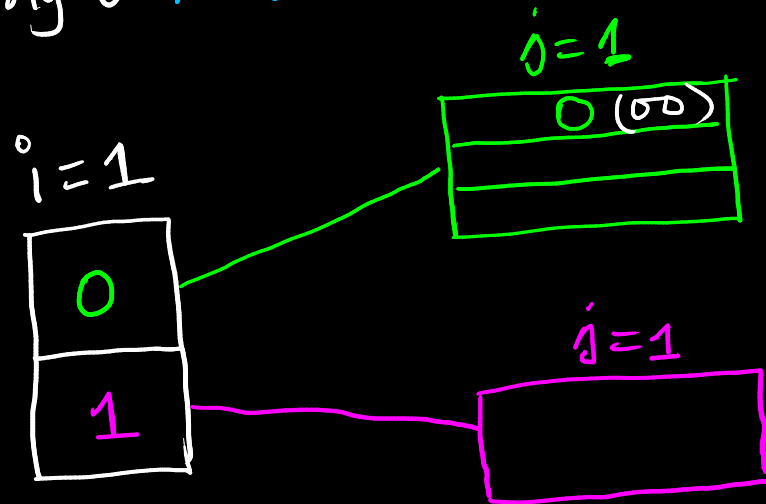
Bucket capacity 3

$$h(x) = x \bmod 4$$

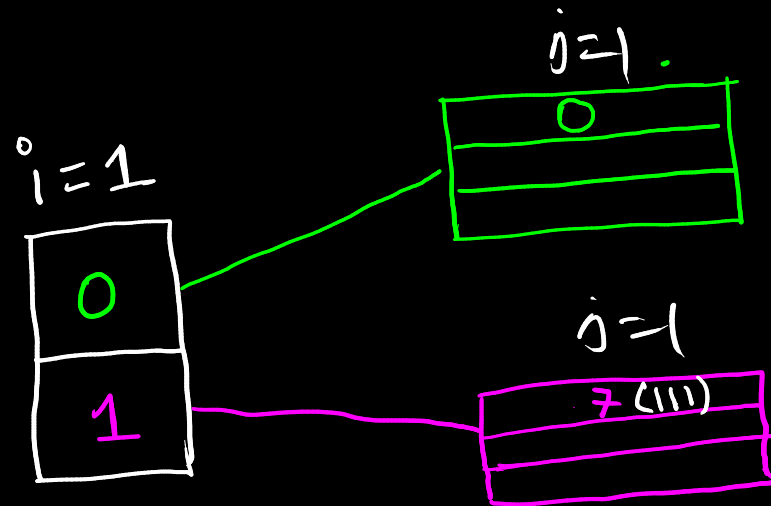
0, 7, 1, 2, 3, 11, 13, 22

initially local & global depth 1

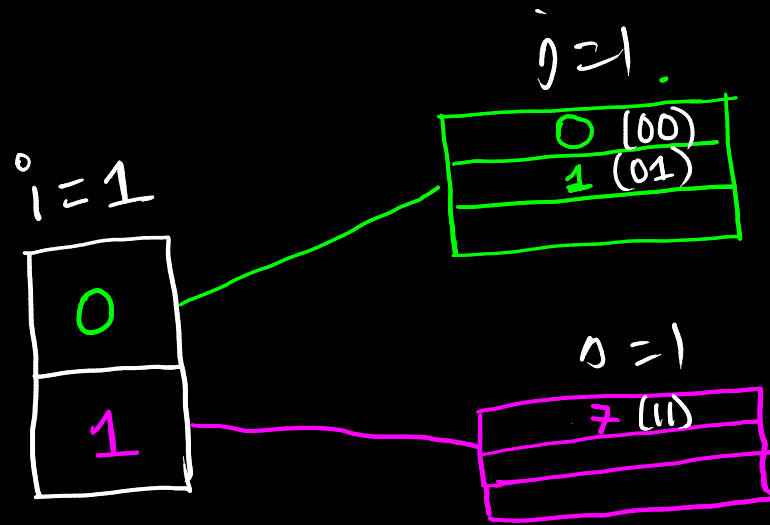
inserting 0 $\rightarrow h(0) = 00$



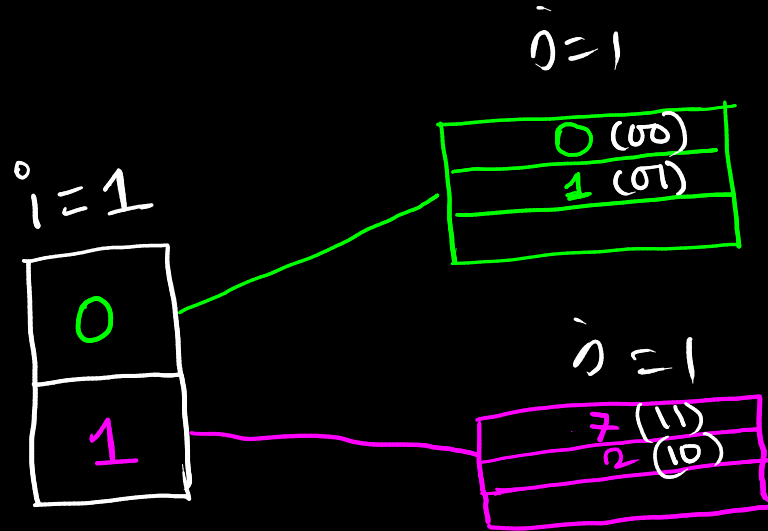
inserting 7 $\rightarrow h(7) \rightarrow 7 \% 4 = 3 \rightarrow$ $\begin{matrix} 111 \\ \uparrow \\ i\text{th bit} \end{matrix}$



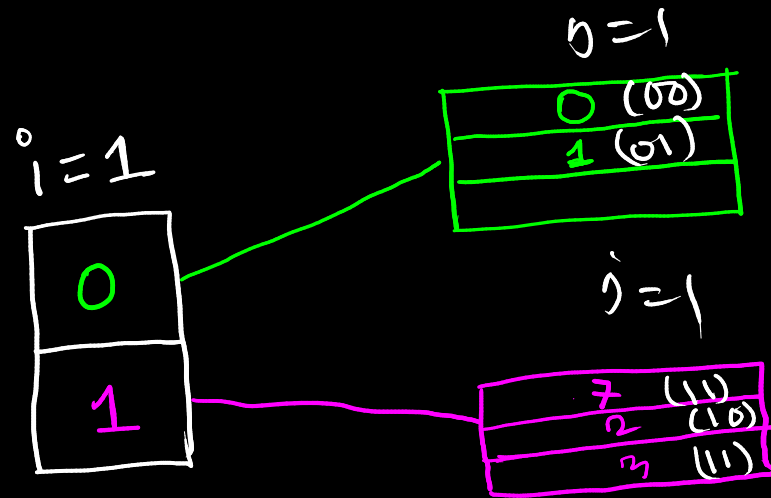
inserting 1 $\rightarrow h(1) = 1 \bmod 4 = 1 = \underline{01}$
ith bit



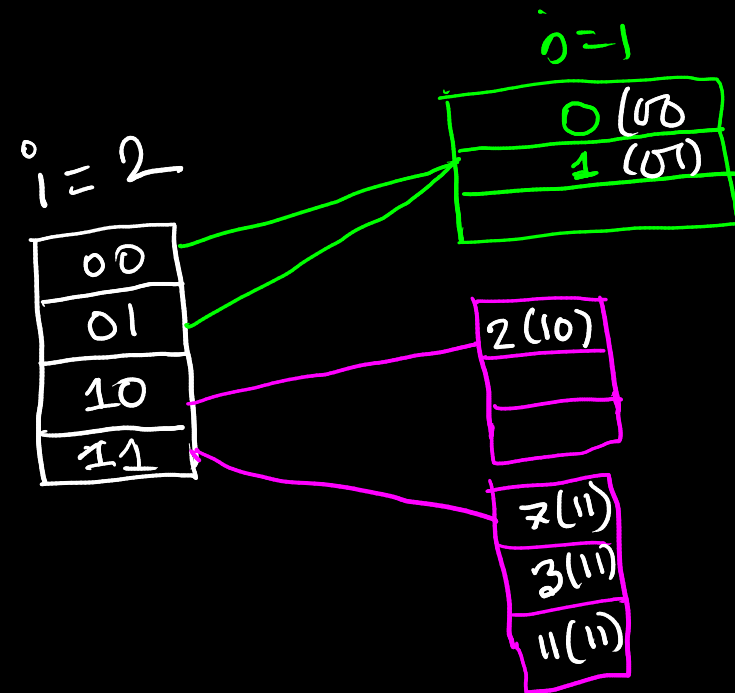
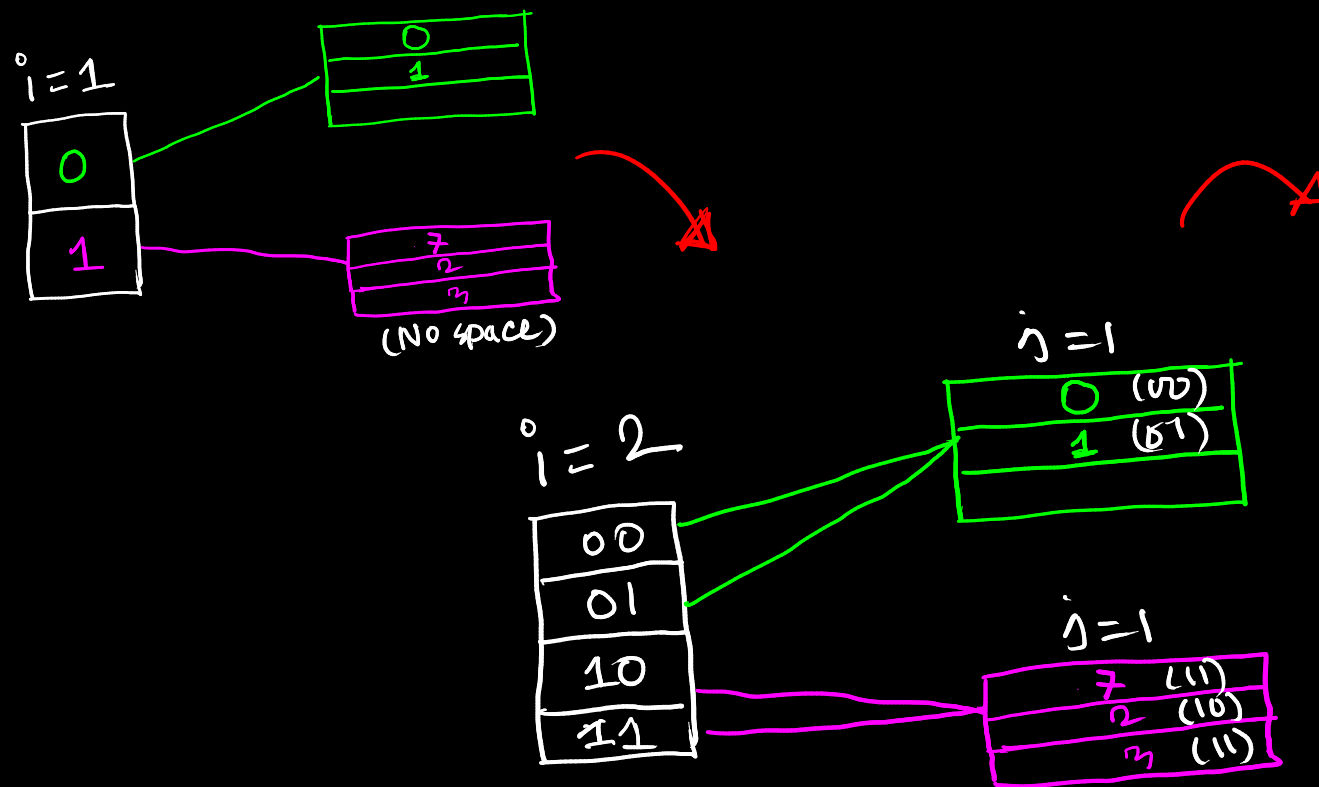
inserting 2 $\rightarrow h(2) = 2 \bmod 4 = 2 = \overset{1}{\underset{\text{ith bit}}{0}}$



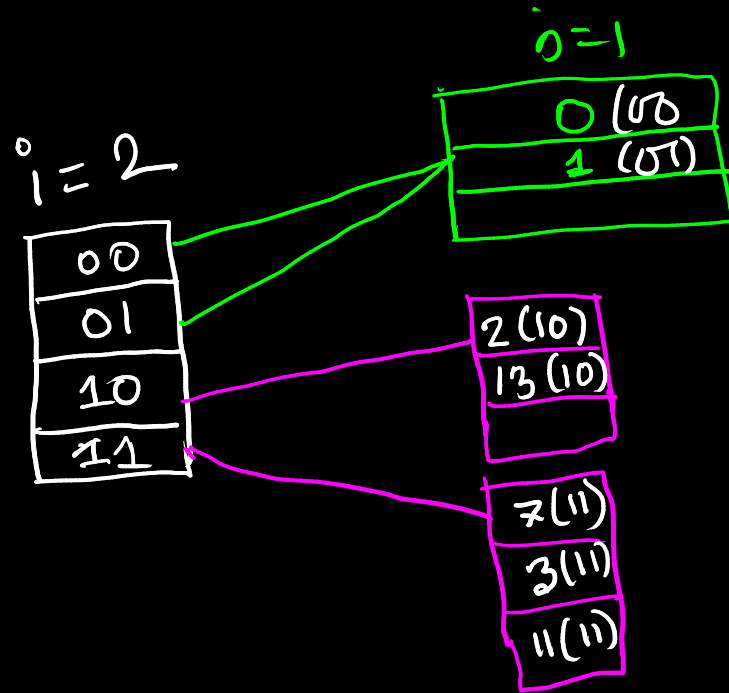
inserting 3 $\rightarrow h(3) = 3 \bmod 4 = 3 = \overset{1}{\underset{\text{ith bit}}{\uparrow}}$



inserting 11 $\rightarrow h(11) = 11 \bmod 4 = 3 = \overset{1}{\underset{\text{ith bit}}{1}}$



inserting 13 $\rightarrow h(13) = 13 \bmod 4 = 1 = \underline{01}$
i bits



inserting 22 $\rightarrow h(22) = 22 \bmod 4 = 2 = \underline{10}_2$
i bits

