

### 3) Lemma 3

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16:13

- There is no entry for  $e$  if  $e$  has never been processed or if entry of  $e$  has been deleted and  $e$  has not been processed after deletion
  - If  $e$  has never been processed:  
 $f_e = 0 \leq \epsilon m \checkmark$
  - If  $e$  has been deleted and not processed afterwards:
    - At moment of deletion Lemma 1 and 2 give us:  $f_e \leq b_{\text{current}} \leq \epsilon m$
    - $f_e$  does not change after deletion because  $e$  is not processed after deletion (otherwise there would be an entry for  $e$  in  $D$ )
    - Also,  $\epsilon m$  only grows after deletion of entry for  $e$  ( $\epsilon$  is constant and  $m$  index of new item)
- $\Rightarrow f_e \leq \epsilon m$  still holds  $\checkmark$