

# CS240

## Fall 2014

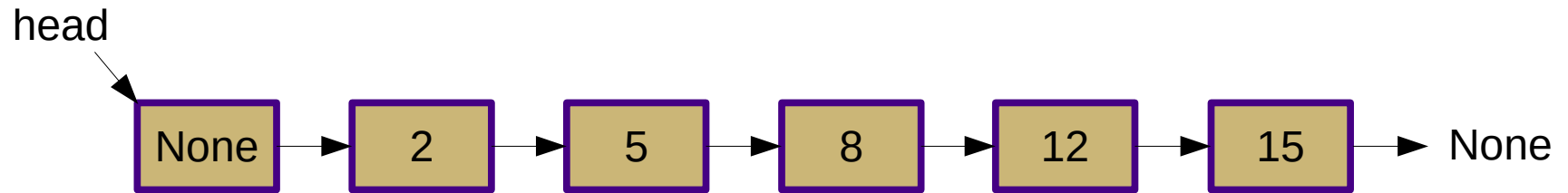
Mike Lam, Professor

# Skip Lists

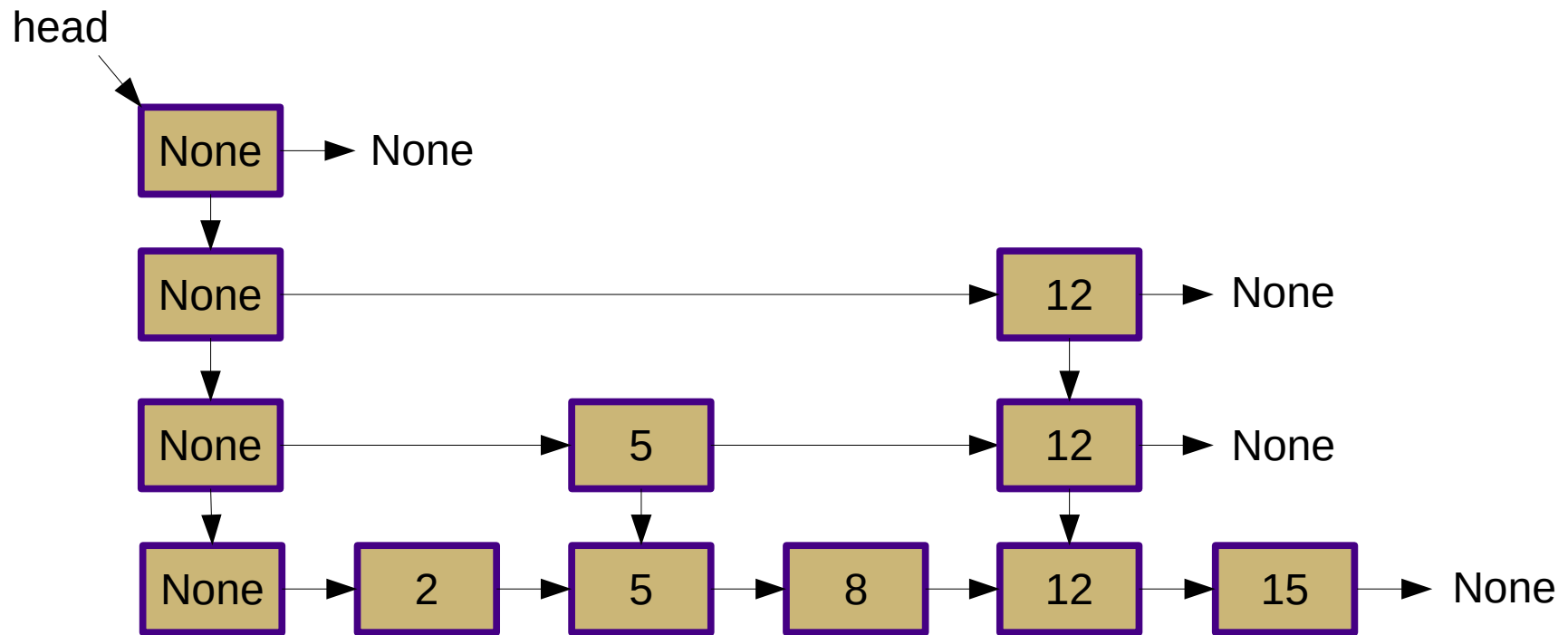
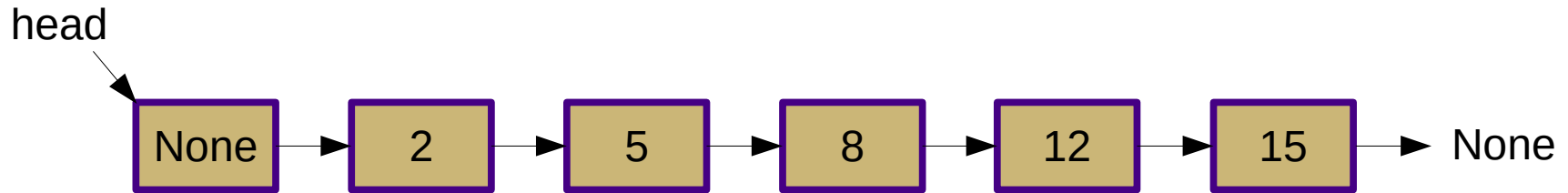
# Skip Lists

- Multi-level sorted linked list
  - Two references `next` and `below`
- Higher levels contain “skip” links to locations further down the list
- All nodes reside in bottom level
- Some nodes have duplicates in higher levels

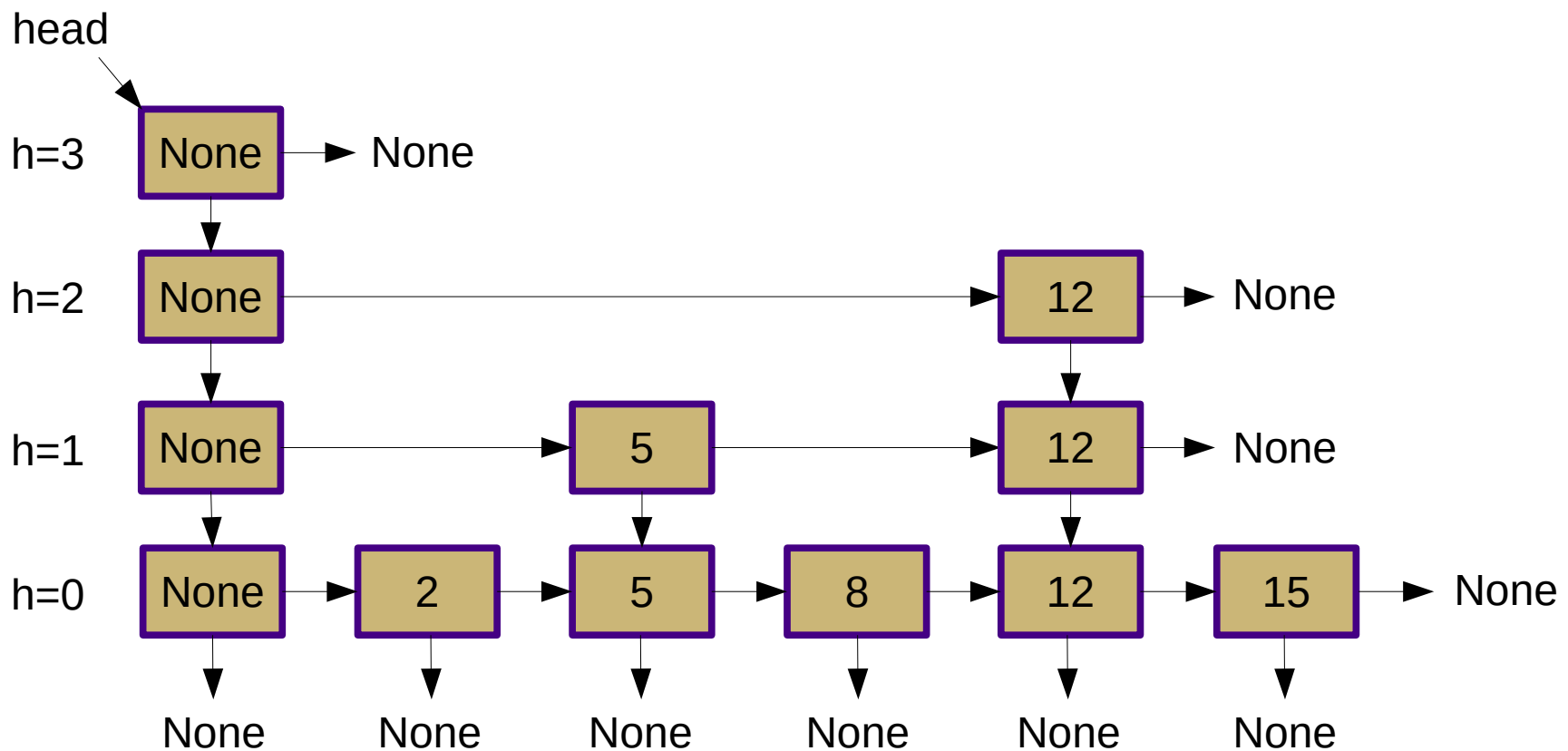
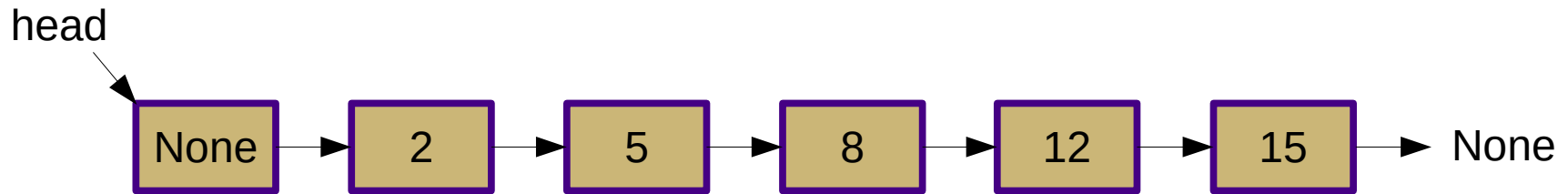
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- Insert, remove, and search all involve a traversal of the list
  - Move right as far as you can, then go down a level and repeat
  - Skips as many nodes as possible
- Visit a roughly constant number of nodes per level
- There will be approximately  $\log n$  levels
  - 1/2 of nodes are only on bottom level, 1/4 are in bottom two levels, 1/8 are in bottom three levels, etc.
  - Halving of input space at each level
- Thus, all three operations are  $O(\log n)$ !