Today

- Intro to Boggle
  - Trees and recursive backtracking!!!!!

- Practice with recursive backtracking
How to play
How to find words?

- You have a dictionary
- You want to find all words on board
- How?

- Write out step-by-step algorithm

Brute force

- Find everything!
- N
  - N-Z
  - N-Z-I
  - N-Z-V
  - N-Z-E
  - N-Z-A
  - N-E
  - N-A
Is there a better way?

• Find everything!
• N
  • N-Z
    • N-Z-I
    • N-Z-V
    • N-Z-E
    • N-Z-A
  • N-E
  • N-A

Is there a better way?

• Find everything!
• N

Words that start with Nz

A list of words that start with Nz (words with the prefix Nz). We search the official scrabble dictionary for scrabble words starting with nz – we take the letter or word you enter, and generate all words starting with Nz. In addition, there is a list of words that end with nz, words that contain nz. Search for words that start with a letter or word.

No Words Found! Try words that end with nz or words that contain nz instead?
Prefixes

- Look at word prefixes
- If prefix doesn’t make a word, STOP
- We should store our words in a data structure to help us

Tries

- Tree-like structure
  - Node
    - word prefix/end
    - Pointer to # nodes
      • Pointer has letter
Let’s trie it!

- “Peter piper picked a peck of pickled peppers”

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Recursion

- void solve(ProblemClass instance)
  - base cases
  - recursion
  - reassemble problem
  - }

Recursive backtracking

- void solve(ProblemClass instance)
  - base cases
  - save current state
  - recursion
  - if current state DIDN’T work
    - remove current state
  - reassemble problem
  - }


Recursive backtracking

- Write `getPathSum`
  - Takes int as `target` sum
  - Returns Stack of Intgers, the path to target sum
    - `getPathSum(19)` returns 7, 15
    - `getPathSum(8)` return an empty stack