LEC 10

CSE 123

Recursive Backtracking

Questions during Class?
Raise hand or send here

sli.do #cse123

BEFORE WE START

Talk to your neighbors:

What's your favorite place to eat on the Ave?

Respond on sli.do!

Instructor: Nathan Brunelle

TAs:

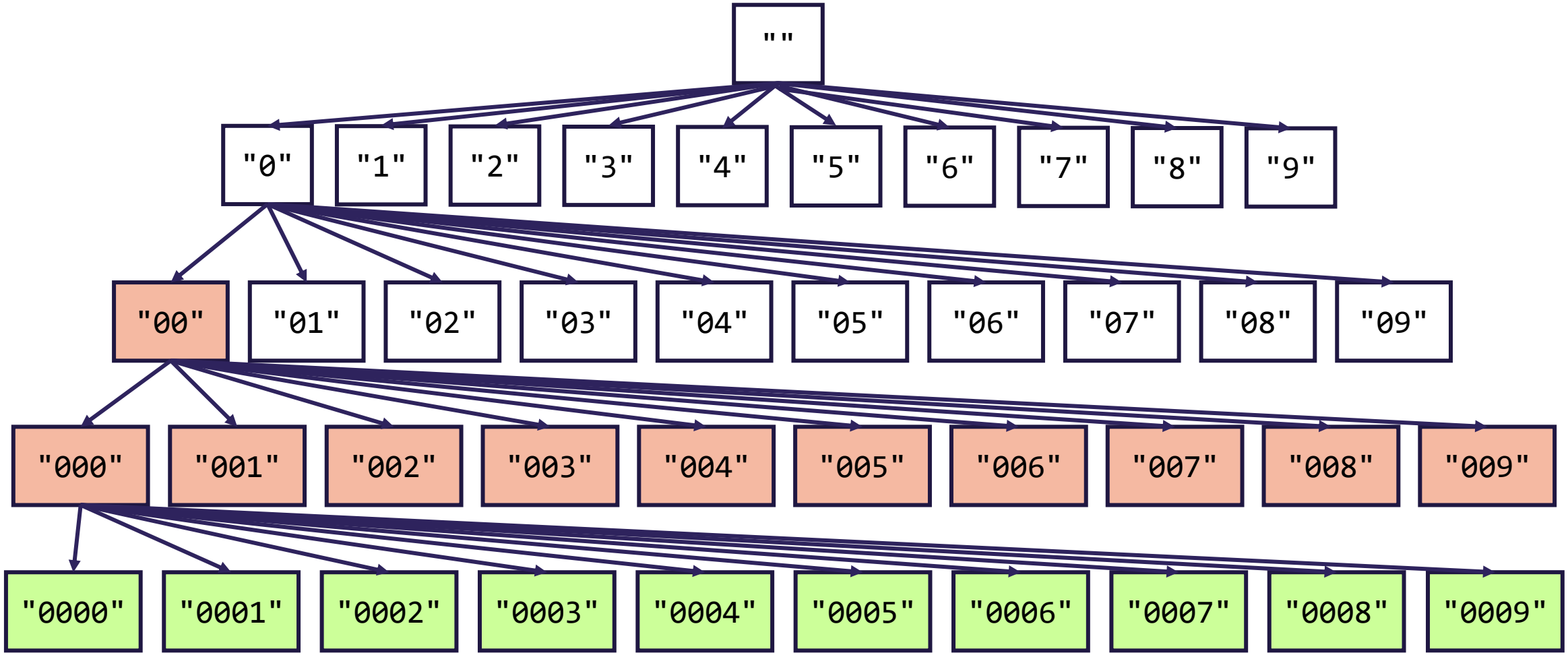
Cora	Chris	Crystal	Anya	Evan
Jonah	Nhan	Saachi	Ishita	Sahana
Chloe	Shiven	Nate	Renee	Yuntong
Amiya	Shashmit	Akshaya	Vihan	Shreedhaarini
Roshan	Adiyan	Nancy	Rachel	Ananya
Ryuta	Mimi	Isaac	Megan	

Announcements

- P1 due tonight
- CQ1 begins tomorrow
  - Last day is 11/12
  - No Quizzes on 11/11
- P2 out tomorrow
- No Class Wednesday next week
  - University Holiday

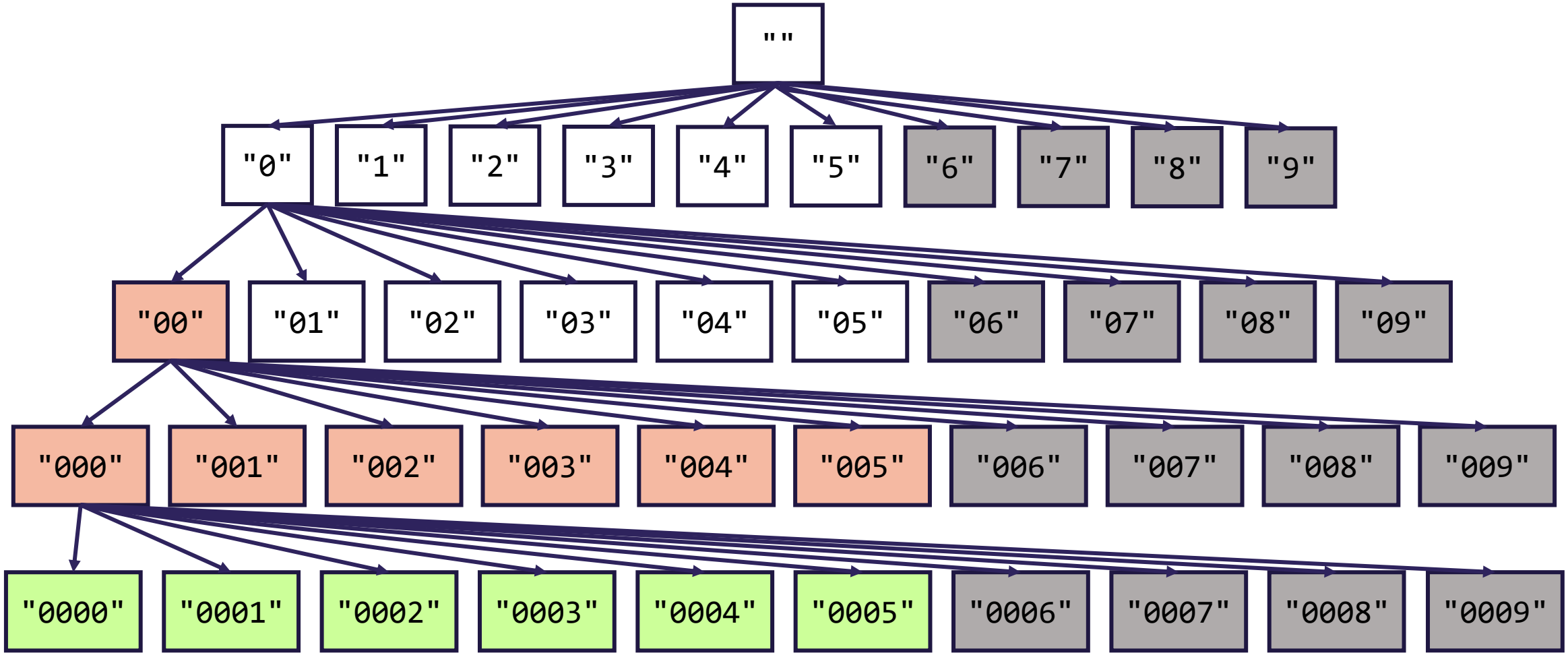
Password Cracker

- Now, what if we knew the sum of all digits was 5?



Password Cracker: Pruning Dead Ends

- Now, what if we knew the sum of all digits was 5?



Updated Exhaustive Search Pattern

```
public static void search(input) {
    search(input, "");
}

private static void search(input, String soFar) {
    if (base case) {
        // Do something with soFar (e.g. print it out)
        System.out.println(soFar);
    } else if (not dead end) {
        // Might not be a loop, but 1 recursive call for each option
        for (each option) {
            search(input, soFar + option);
        }
    }
}
```

Recursive Backtracking Pattern

```
private static void search(input, List<Character> soFar) {
    if (base case) {
        // Do something with soFar (e.g. print it out)
        System.out.println(soFar);
    } else if (not dead end) {
        // Might not be a loop, but 1 recursive call for each option
        for (each option) {
            soFar.add(option);                  // Choose
            search(input, soFar);               // Explore
            soFar.remove(soFar.size() - 1);     // Unchoose
        }
    }
}
```

Scrabble

- We have a set number of letter tiles to choose from in a given turn
- Each letter has a particular number of points associated with it
- Our goal: find the best (highest-scoring) word we can make by combining our letter tiles

