Objectives

- A new data type: Lists
- Broader Issue: self-driving cars

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Review

• What are the various things we can do with strings?

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Sequences of Data

- Sequences so far ...
 - > str: sequence of characters
 - range: generator (sequence of numbers)
- We commonly group a sequence of data together and refer to them by one name
 - > Days of the week: Sunday, Monday, Tuesday, ...
 - Months of the year: Jan, Feb, Mar, ...
 - Shopping list
- Can represent this data as a list in Python
 - Similar to arrays in other languages

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Lists: A Sequence of Data Elements daysInWeek element "Sun" "Mon" "Tue" "Wed" "Thu" "Fri" "Sat" 3 5 0 2 4 6 Position/ len(daysInWeek) is 7 index in the list • Elements in lists can be any data type What does does this look similar to, in structure?

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Example Lists in Python

- Empty List: []
- List of Strs:
 - > daysInWeek=["Sun", "Mon", "Tue", "Wed", "Thu", "Fri", "Sat"]
- List of floats
 - ▶ highTemps=[60.4, 70.2, 63.8, 55.7, 54.2]
- Lists can contain >1 type
 - wheelOfFortune=[250, 1000, "Bankrupt", "Free Play"]

Syntax for list: []

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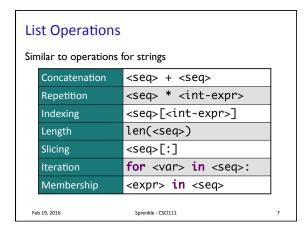
How different from accessing a string? Sprenkle - CSCI111

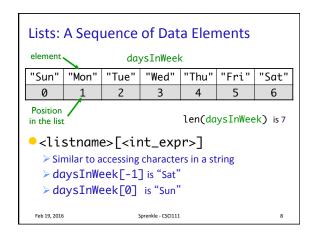
Benefits of Lists

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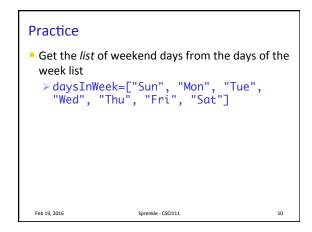
- Group related items together
 - ➤ Instead of creating separate variables
 - sunday = "Sun"
 - omonday = "Mon"
- Convenient for dealing with large amounts of
 - Example: could keep all the temperature data in a list if needed to reuse later
- Functions and methods for handling, manipulating lists

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Iterating through a List Read as > For every element in the list ... An item in the list list object for item in list: Iterates through print(item) items in list Equivalent to for x in range(len(list)): Iterates through positions in list print(list[x]) Sprenkle - CSCI111 daysOfWeek.py Feb 19, 2016



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Practice

• Get the list of weekend days from the days of the week list

> daysInWeek=["Sun", "Mon", "Tue", "Wed", "Thu", "Fri", "Sat"]

> weekend = daysInWeek[:1] + daysInWeek[-1:] Gives back a list or

> weekend = [daysInWeek[0]] + Gives back an element of list, which is a Str<sup>1</sup>
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Membership

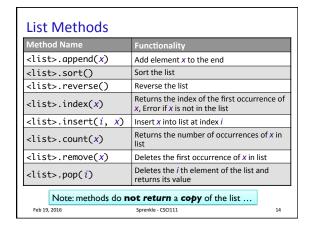
• Check if a list contains an element

• Example problem

> enrolledstudents is a list of students who are enrolled in the class

> Want to check if a student who attends the class is enrolled in the class

if student not in enrolledstudents:
    print(student, "is not enrolled")
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Practice in Interactive Mode

| list = [7,8,9] |
| string = "abc" |
| list[1] |
| string[1] |
| string.upper() |
| list.reverse() |
| string |
| list |
| string = string.upper() |
| list = list.reverse() |
| string |
| list |
```

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    Special Value: None
    Special value we can use

            E.g., Return value from function when there is an error

    Similar to null in Java
    If you execute

            list = list.sort()
            print(list)
            Prints None because list.sort() does not return anything
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Fibonacci Sequence

• Goal: Solve using list

• F_0=F_1=1

• F_n=F_{n-1}+F_{n-2}

• Example sequence: 1, 1, 2, 3, 5, 8, 13, 21, ...
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Fibonacci Sequence • Create a list of the 1st 15 Fibonacci numbers ➤ F₀=F₁=1; F_n=F_{n-1}+ F_{n-2} Grow list as we go fibs = [] # create an empty list fibs.append(1) # append the first two Fib numbers fibs.append(1) for x in range(2, 16): # compute the next 13 nums newfib = fibs[x-1]+fibs[x-2] fibs.append(newfib) print(fibs) # print out the list Feb 19, 2016 Sprenkle-CSCI11 fibs.py 19

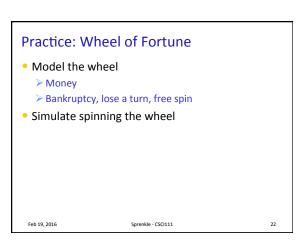

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Practice: Wheel of Fortune

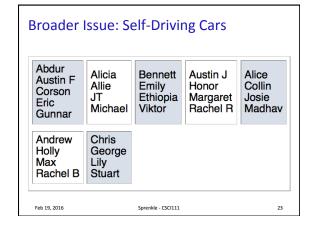
• Modify to keep track of previous guesses

➤ If user made that guess before, print message

• What are the data types of the data we're modeling?

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Broader Issues Discussion • What are the pros and cons to automated cars? • We talk a lot about testing in this class. ➤ When would you consider that the car has been tested enough? ➤ What are good test cases for automated cars? • Would you feel safe/safer with a self-driving car or an Uber/Lyft driver? ➤ Does your feeling depend on anything else? • What should the next DARPA Challenge be?

Looking Ahead

• Extra credit opportunities

> Review CS articles (similar to broader issues)

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