Strings, Puzzle App I
CSE 120 Winter 2018

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Going beyond Pokemon Go: preparing for an augmented reality future

“Franzi argues that AR is essentially different than other kinds of technology we interact with because of its immersive potential. ‘It is directly sitting between your perception of reality and your actions in the physical world,’ she says.

"What can those apps do once they have the ability to change your view of the physical world? ...If you're driving, an application might block your view of pedestrians crossing the street," Franzi says, ‘or they might startle you with scurrying spiders.’”

Administrivia

❖ Assignments:
  ▪ Controlling Elli due tonight before 11:59 pm (2/12)
  ▪ Color Filters due before section tomorrow (2/13)
  ▪ Reading Check 6 due before section Thursday (2/15)
  ▪ Word Guessing due Friday (2/16)
  ▪ Living Computers Museum Report due next Tuesday (2/20)

❖ Programming assignments: checked off OR submitted
  ▪ We highly recommend getting checked off

❖ “Big Ideas” lecture on Friday: Artificial Intelligence
Strings

- A **string** is a string of characters (0 or more)
  - Strings cannot be modified, but string variables can be reassigned
  - Individual characters can be accessed (not modified), numbered from left-to-right **starting at 0**

- **String literal**: an unnamed string specified between double-quotes
  - *e.g.* "hello", "!@#$%^&*()_+ ?~", "xoxo <3"
  - "" is known as the **empty string** (0 characters in it)
Using Strings

- **Declaration:** `String str;`
- **Assignment:** `str = "hello";`

- Get character using `str.charAt(i)`
- Get length using `str.length()`

- Concatenation: join strings using `+` operator
  - e.g. `"hi " + "there"` gives you `"hi there"

- Conversion to string usually occurs implicitly
  - Can also explicitly use `str()`
Strings vs. Arrays

- Strings are *sort of* like arrays of characters:

<table>
<thead>
<tr>
<th></th>
<th>Array</th>
<th>String</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declare</td>
<td><code>char[7] charArray;</code></td>
<td><code>String str;</code></td>
</tr>
<tr>
<td>Initialize</td>
<td><code>charArray = {'h', 'i', '!'};</code></td>
<td><code>str = &quot;hi!&quot;;</code></td>
</tr>
<tr>
<td>Get element</td>
<td><code>charArray[1]</code></td>
<td><code>str.getChar(1)</code></td>
</tr>
<tr>
<td>Get length</td>
<td><code>charArray.length</code></td>
<td><code>str.length()</code></td>
</tr>
</tbody>
</table>
Example: Recording User Input

- keyPressed() lets you read user input 1 character at a time

- Use a String variable to “store”
  - Add/append new characters using concatenation
Example: Recording User Input

- **keyPressed()** lets you read user input 1 character at a time

- Use a **String** variable to “store”
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```java
String input = "";

void draw() {
}

void keyPressed() {
    input = input + str(key);
    println("input = " + input);
}
```
Word Guessing

- Learn to use text input & output
  - Player 1 enters a secret phrase
  - Player 2 tries to guess the secret phrase
  - Game tells you how many letters correct & # of attempts

Enter secret phrase:
Outline

- The Game
- Design Phase
- Coding Phase
15 Puzzle

- Sliding puzzle that consists of numbered square tiles in random order with one tile missing
  - Also known as “Mystic Square”

- We will program just the game mechanics
  - Won’t do winning condition, since not all game states are solvable
App Mechanics

- Tiles numbered 1-15 are shown on game board
  - One “open” or “empty” square

- Clicking a tile next to the empty square will “slide” that tile into the empty space
  - Clicking other tiles has no effect
  - Clicking outside of the game board has no effect

- Include a Reset button to return the game board to its initial state
Outline

- The Game
- **Design Phase**
- Coding Phase
Design the Layout
Coding Decisions

- How to represent the state of the game board?
  ```
  int[] board = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15};
  ```

- How to implement the “slide” functionality?
  - swap values in array

- How to respond to clicks?
  1. detect click on Reset button (reset)
     - rectangular region
  2. detect click on tile (possibly slide)
     - rectangular region of game board
     - calculate tile coordinates of click
Outline

- The Game
- Design Phase
- Coding Phase
Create the Reset Button
Create the Tile Layout