Interactors
Chris Piech
CS106A, Stanford University
HashMap Recap

key → value
HashMap Recap

(key) animal ➔ (value) animal sound

Values: "bark" "ow ow ow" "meow"
Keys: "dog" "seal" "cat"
HashMap Recap

**key**  ➡️  **value**

(String) animal ➡️ (String) animal sound

(String) name ➡️ (int) phone number

6701678
HashMap Recap

**key** \[\rightarrow\] **value**

(String) animal \[\rightarrow\] (String) animal sound

(String) name \[\rightarrow\] (int) phone number

(GRect) key \[\rightarrow\] (AudioClip) note
The user enters a query

You give the results
HashMap<String, ArrayList<String>> database;

The user enters a query

You give the results
HashMap<String, ArrayList<String>> database;
The user enters a query

You give the results

HashMap<String, ArrayList<String>> database;
Apprach #2: HashMap

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>piech</td>
<td>[&quot;Chris Piech (cpiech)&quot;]</td>
</tr>
<tr>
<td>cpiech</td>
<td>[&quot;Chris Piech (cpiech)&quot;]</td>
</tr>
</tbody>
</table>
| chris | ["Chris Collins (ccollins)",
   "Chris Koenig (ckoenig)",
   "Chris Piech (cpiech)",
   "Chris Wang (cwang)"
]      |
| wang  | ["Anna Wang (awang)",
   "Avery Wang (awang)",
   "Chris Wang (cwang)",
   "Lisa Wang (lwang)"
]      |
1. Make a HashMap

```java
HashMap<KeyType, ValueType> myMap =
    new HashMap<KeyType, ValueType>();
```

2. Put and get values into a map

```java
myMap.put(key, value);
myMap.get(key) // returns the corresponding value
```

3. Some useful other methods

```java
int size = myMap.size();
myMap.contains(key); // returns true or false if key is in map
myMap.keySet();
myMap.remove(key); // make like a tree and leave!
```

4. Iterate using a foreach loop

```java
for(keyType key : myMap.keySet()){  // not ordered
    myMap.get(key); // do something with the key/value pair
}
```
Interactors
Where are we?

- Karel the Robot
- Java
- Console Programs
- Graphics Programs
- Text Processing
- Data Structures
- **GUIs**
- Defining our own Variable Types
Button demo
Assignment 5: ImageShop

Due: Monday, Feb 26th, 11a.m.
YEAH Hours: Tues. 2/20 7-8pm in 380-380C

Look familiar?
Adding Iteractors

• When you create an instance of any Program subclass, Java divides the window area into five regions as follows:

  NORTH
  |
  |   CENTER   |
  |
  NORTH
  |
  |
  SOUTH

• The CENTER region is typically where the action takes place. A ConsoleProgram adds a console to the CENTER region, and a GraphicsProgram puts a GCanvas there.

• The other regions are visible only if you add an interactor to them. The examples in the text use the SOUTH region as a control strip containing a set of interactors, which are laid out from left to right in the order in which they were added.
JLabel
JLabel label = new JLabel("Hi");
JLabel label = new JLabel("Hi");
```java
JLabel label = new JLabel("Hi");
add(label, SOUTH);
```
JTextField
```java
JTextField field = new JTextField(10);
add(field, SOUTH);

... field.getText(); // returns string in field
field.setText("Good times");
```
JTextField field = new JTextField(10);
add(field, SOUTH);

... 

field.getText(); // returns string in field
field.setText("Good times");
JTextField field = new JTextField(10);
add(field, SOUTH);

... 
field.getText(); // returns string in field
field.setText("Good times");
JTextField field = new JTextField(10);
add(field, SOUTH);
...
field.getText(); // returns string in field
field.setText("Good times");
JTextField field = new JTextField(10);
add(field, SOUTH);

... 
field.getText(); // returns “some input”
field.setText("Good times");
 JTextField field = new JTextField(10);
add(field, SOUTH);
...
field.getText(); // returns “some input”
field.setText("Good times");
JTextField

JTextField field = new JTextField(10);
add(field, SOUTH);
...
field.getText(); // returns “some input”
field.setText("Good times");

// now hitting enter will trigger action
textField.addActionListener(this);
JButton
JButton button = new JButton("Press me");
JButton button = new JButton("Press me");
JButton button = new JButton("Press me");
add(button, SOUTH);
public void actionPerformed(ActionEvent e) {
    println(e.getActionCommand());
}
All together now

Hello, Chris
Hello, world
Hello, darkness

Name: darkness
PRESS ME
Recall the Dancing Children
Normal Program

Run Method
Normal Program

Run Method

```java
public void run() {
    for(int i = 0; i < N_DRIBBLES; i++) {
        dropOneDribble();
    }
}
```
Normal Program

Run Method

```java
public void run() {
    for (int i = 0; i < N_DRIBBLES; i++) {
        dropOneDribble();
    }
}
```
New Listener Characters

Action Listener

Action Performed

Piech, CS106A, Stanford University
### Program Starts Running

<table>
<thead>
<tr>
<th>Run Method</th>
<th>Action Performed</th>
</tr>
</thead>
</table>

Piech, CS106A, Stanford University
Add Action Listeners

Run Method

 addActionListeners();

Action Performed

Action Listener
Program Runs as Usual

Run Method

Action Performed

Action Listener

Piech, CS106A, Stanford University
Button Clicked!

Run Method

Action Performed

Action Listener

Piech, CS106A, Stanford University
Calls Action Performed Method

Run Method  Action Performed  Action Listener

Piech, CS106A, Stanford University
When done, Run continues.

Run Method

Action Performed

Action Listener
Keeps Doing Its Thing...

Run Method  Action Performed  Action Listener
Button Clicked!

Run Method

Action Performed

Action Listener

Piech, CS106A, Stanford University
Calls Action Performed Method

Run Method  Action Performed  Action Listener

Piech, CS106A, Stanford University
When done, Run continues.

Run Method  Action Performed  Action Listener
Recall the Dancing Children
Oh wow!
Dag, yo.
Oh wow!
something awesome

*idea credits to Keith
The XKCD Color Survey
Volunteers (online) were shown a randomly-chosen color and asked to name the color.

The result is (after filtering) about 2.8 million RGB triplets and their names.

What do people think the colors are?
The File Format

<table>
<thead>
<tr>
<th>color-name</th>
<th>red, green, blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>teal</td>
<td>light purple</td>
</tr>
<tr>
<td>sky blue</td>
<td>dark blue</td>
</tr>
<tr>
<td>dark blue</td>
<td>dark blue</td>
</tr>
<tr>
<td>blue</td>
<td>light blue</td>
</tr>
<tr>
<td>green</td>
<td>light blue</td>
</tr>
<tr>
<td>blue</td>
<td>light blue</td>
</tr>
<tr>
<td>red</td>
<td>light blue</td>
</tr>
<tr>
<td>green</td>
<td>light blue</td>
</tr>
<tr>
<td>blue</td>
<td>light blue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color Name</th>
<th>Hex Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>teal</td>
<td>#811B92</td>
</tr>
<tr>
<td>sky blue</td>
<td>#00BFFF</td>
</tr>
<tr>
<td>dark blue</td>
<td>#00008B</td>
</tr>
<tr>
<td>blue</td>
<td>#0000FF</td>
</tr>
<tr>
<td>green</td>
<td>#008000</td>
</tr>
<tr>
<td>red</td>
<td>#FF0000</td>
</tr>
<tr>
<td>light blue</td>
<td>#00FFFF</td>
</tr>
<tr>
<td>light purple</td>
<td>#C0C0C0</td>
</tr>
</tbody>
</table>

- teal: #811B92
- sky blue: #00BFFF
- dark blue: #00008B
- blue: #0000FF
- green: #008000
- red: #FF0000
- light blue: #00FFFF
- light purple: #C0C0C0
How to Structure Data

associate each color name with a list of colors

Piech, CS106A, Stanford University
How to Structure Data

HashMap<color name, list of colors>
How to Structure Data

HashMap<String, list of colors>
HashMap<String, ArrayList<color>>
HashMap<String, ArrayList<Color>>
Displaying Colors

Piech, CS106A, Stanford University
Further Reading

- [http://blog.xkcd.com/2010/05/03/color-survey-results/](http://blog.xkcd.com/2010/05/03/color-survey-results/)