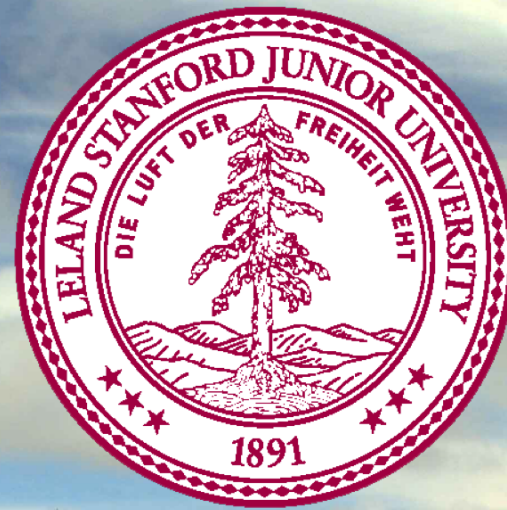




Advanced Maps and Interactors

Julia Daniel for Chris Piech
CS106A, Stanford University



You're not Chris...

HashMap Recap

key



value



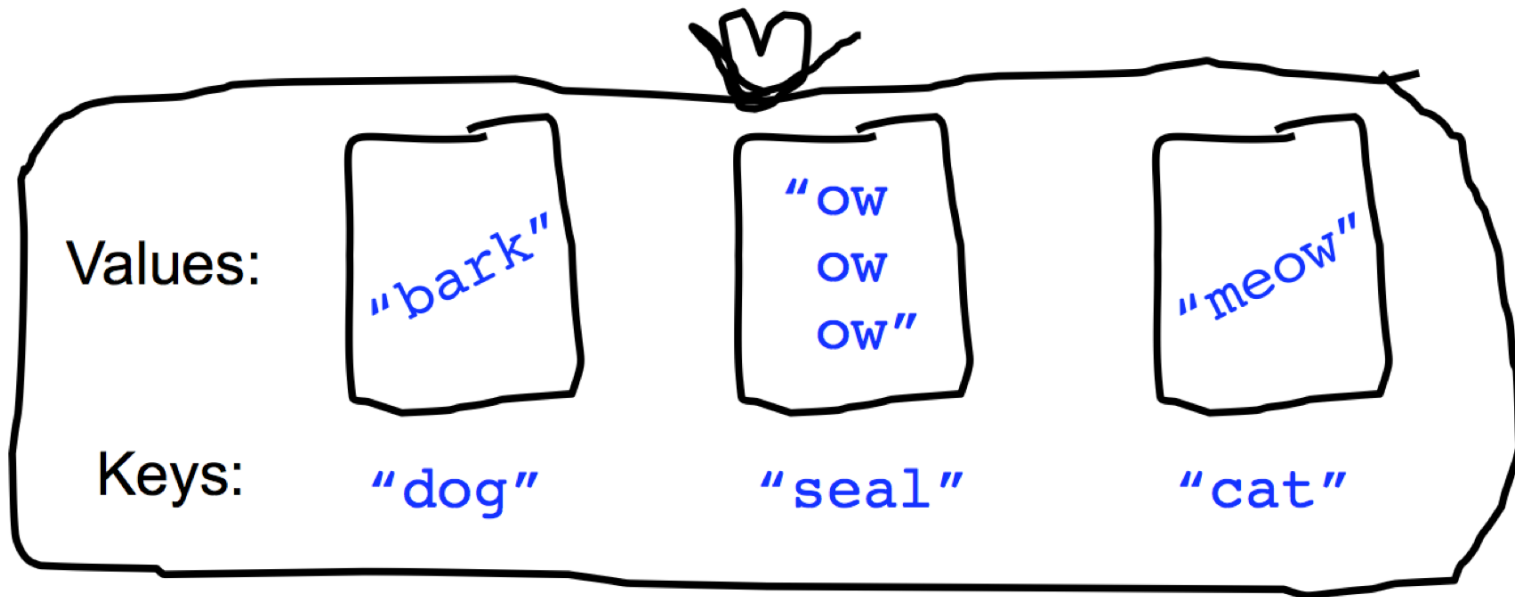
HashMap Recap

key



value

(String) animal → (String) animal sound



HashMap Recap

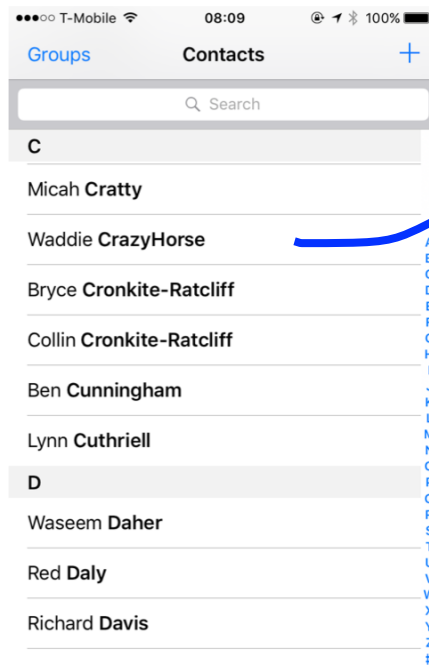
key



value

(String) animal → (String) animal sound

(String) name → (int) phone number



6701678



HashMap Recap

key

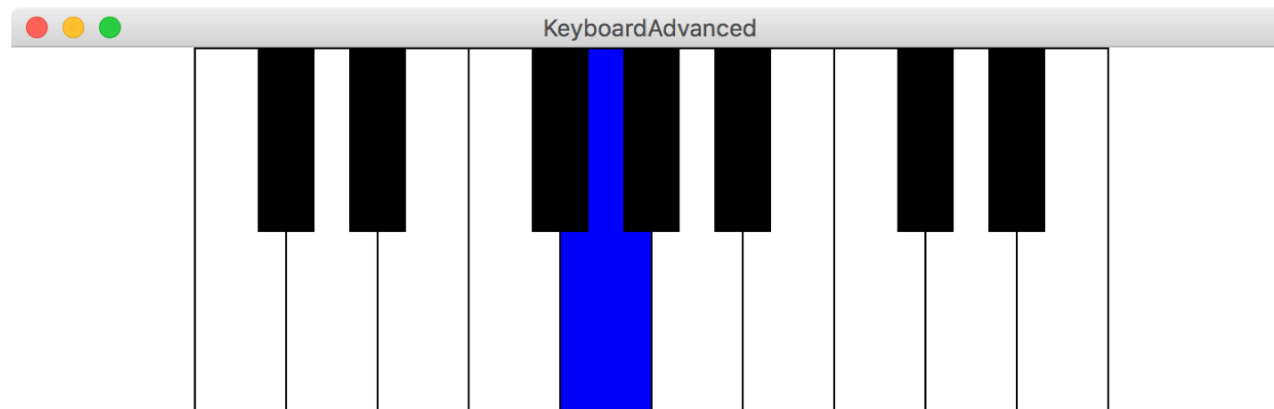


value

(String) animal → (String) animal sound

(String) name → (int) phone number

(GRect) key → (AudioClip) note



HashMaps on one slide

1. Make a HashMap

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

2. Put and get values into a map

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

3. Some useful other methods

```
int size = myMap.size();  
myMap.containsKey(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

```
for(keyType key : myMap.keySet()){ // not ordered  
    myMap.get(key); // do something with the key/value pair  
}
```



Why is this so fast?



mantis shrimp colors



All

Videos

Shopping

Images

News

More

Settings

Tools

About 1,870,000 results (0.54 seconds)

Humans and many other primates have three; some birds and reptiles have four photoreceptors. Certain butterflies can even have six. But the mantis shrimp has **12** different types of photoreceptors in their eyes – and scientists haven't understood why until now. Jan 27, 2014



Study Offers Insights into Unique Color Vision of Mantis Shrimp ...

www.sci-news.com/biology/science-color-vision-mantis-shrimp-01719.html



Why is this so fast?



```
int hash(string key);
```

* Learn more in CS106B



Why is this so fast?



```
int hash(string key);
```

(but we lose sortedness)

* Learn more in CS106B



Interactors

Where are we?

- Karel the Robot
- Java
- Console Programs
- Graphics Programs
- Text Processing
- Data Structures
- **GUIs**
- Defining our own Variable Types



Button demo

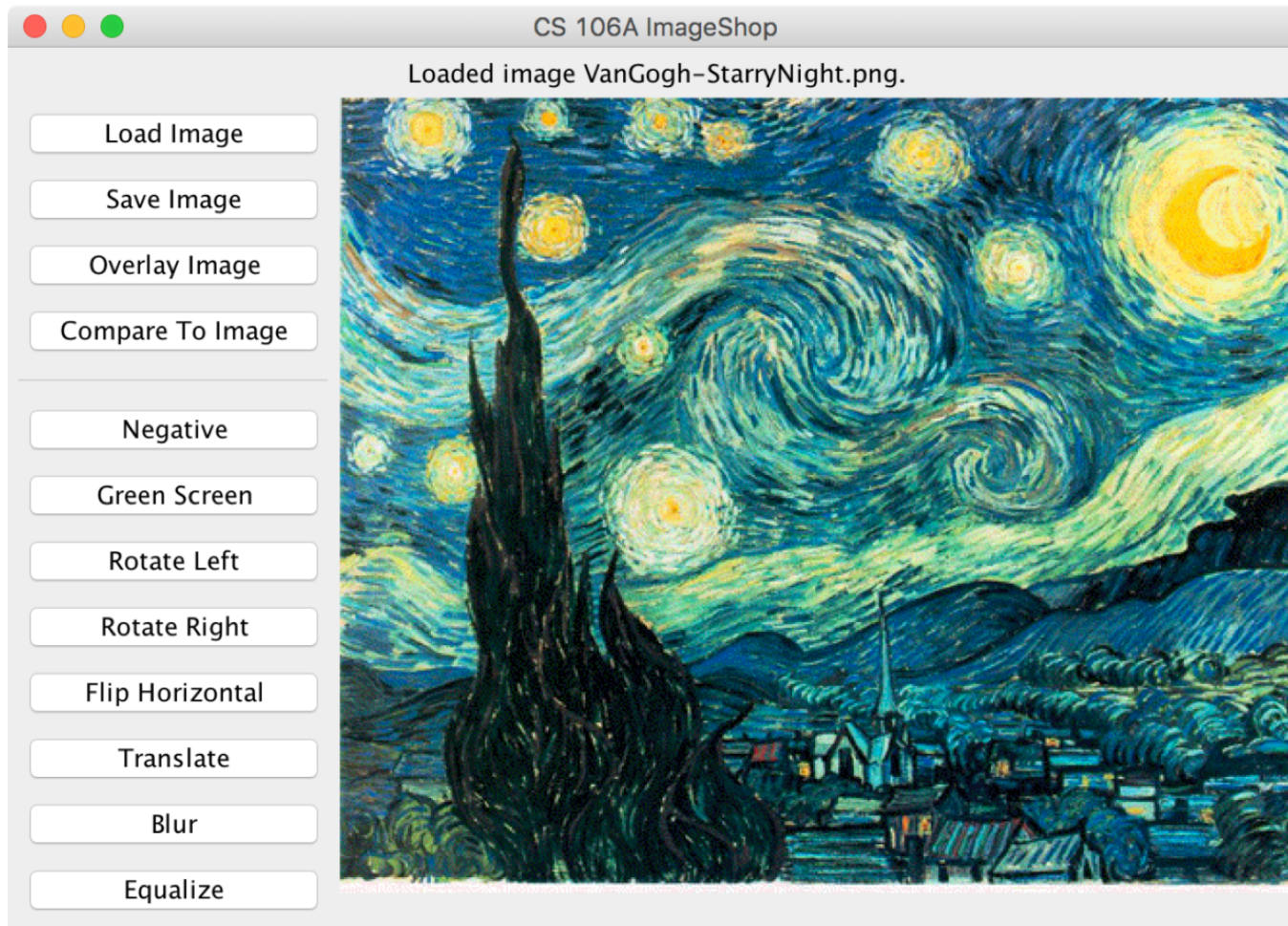


Look familiar?

Assignment 5: ImageShop

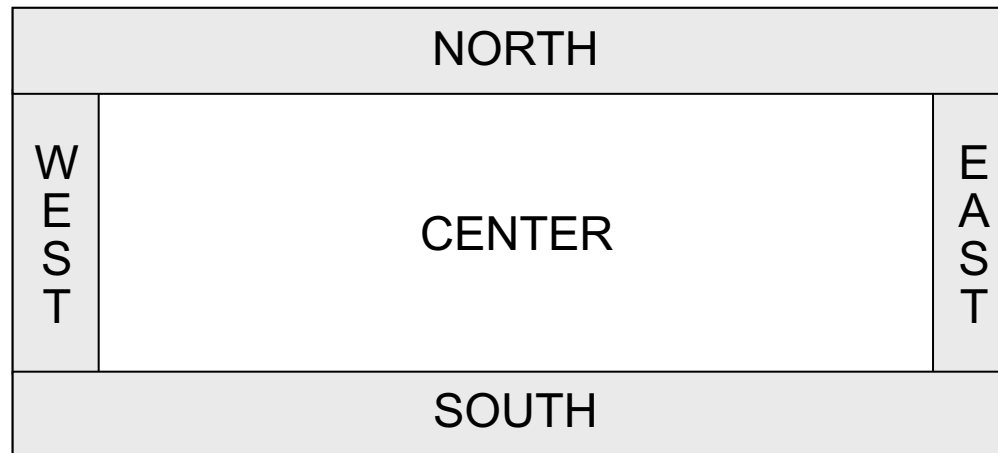
 **DUE: MONDAY, FEB 26TH, 11A.M.**

 **YEAH HOURS: TUES. 2/20 7-8PM IN 380-380C**



Adding Interactors

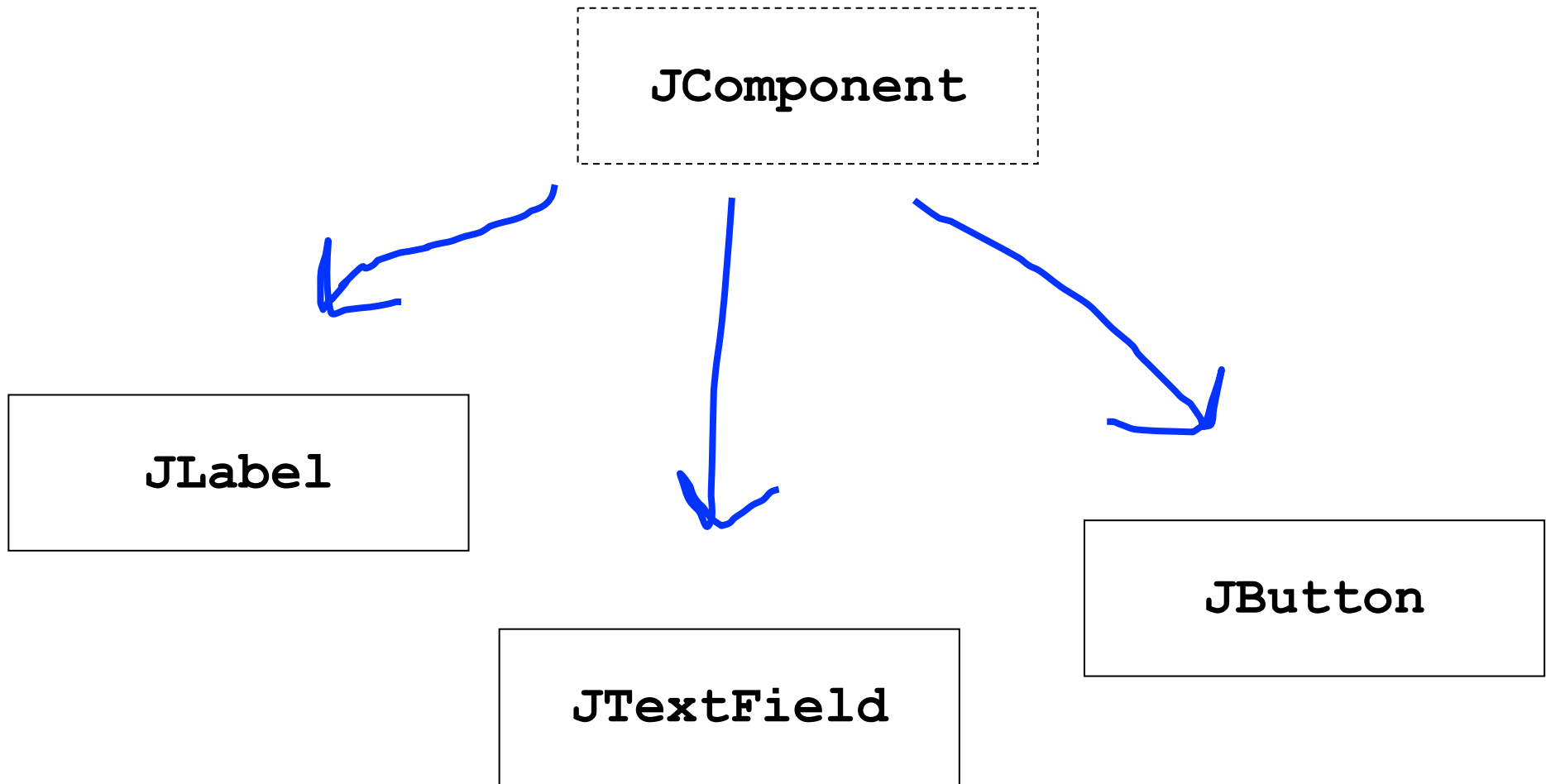
- When you create an instance of any **Program** subclass, Java divides the window area into five regions as follows:



- 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.



JComponents



JLabel

JLabel

```
JLabel label = new JLabel("Hi");
```



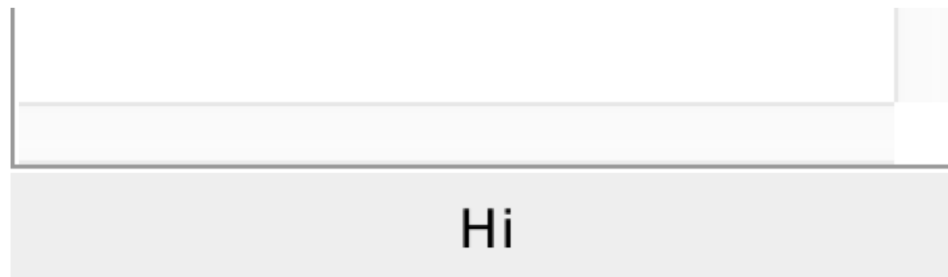
JLabel

```
JLabel label = new JLabel("Hi");
```



JLabel

```
JLabel label = new JLabel("Hi");  
add(label, SOUTH);
```



UITextField

JTextField

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



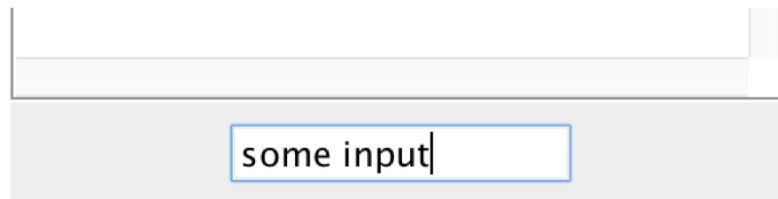
JTextField

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



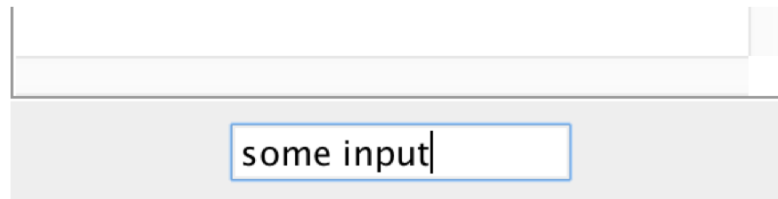
JTextField

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



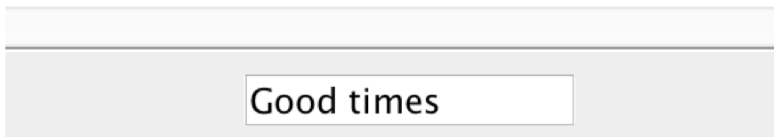
JTextField

```
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");
```



JButton

JButton

```
 JButton button = new JButton("Press me");
```



JButton

Button Text

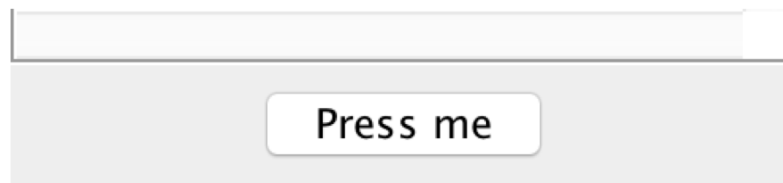


```
.JButton button = new JButton("Press me");
```



JButton

```
JButton button = new JButton("Press me");  
add(button, SOUTH);
```

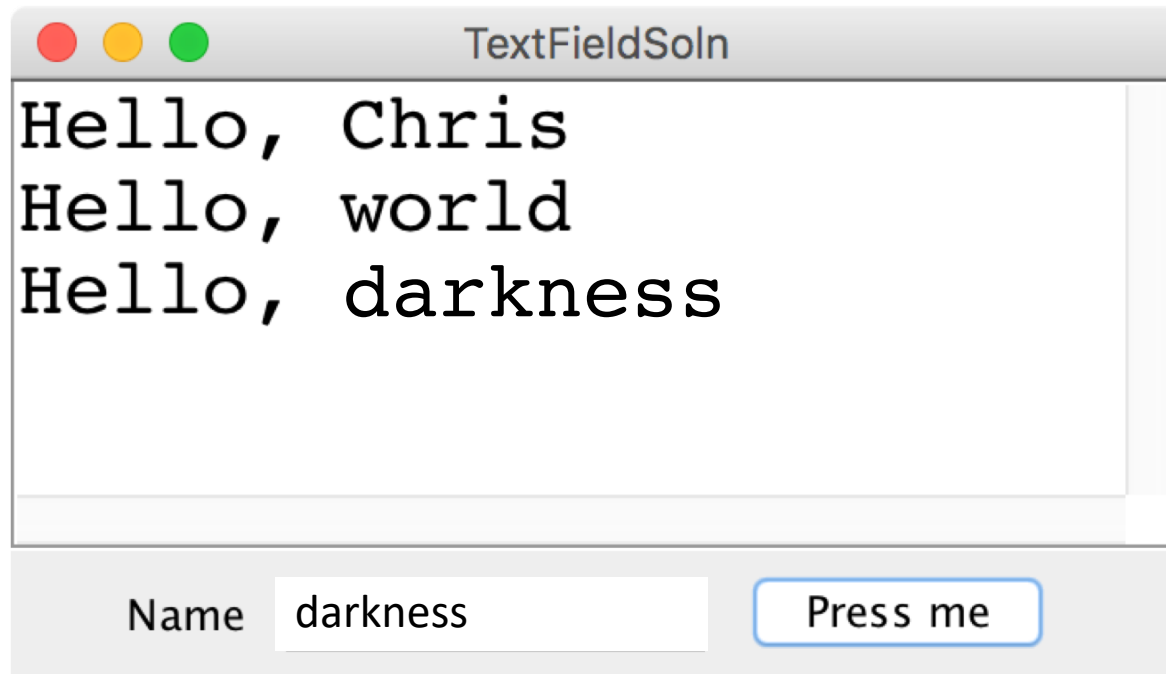


JButton

```
public void actionPerformed(ActionEvent e) {  
    println(e.getActionCommand());  
}
```



All together now

A screenshot of a Java Swing window titled "TextFieldSoln". The window has a standard macOS-style title bar with red, yellow, and green window control buttons. The main content area is a text field containing three lines of text: "Hello, Chris", "Hello, world", and "Hello, darkness". Below the text field is a light gray footer bar. On the left of this bar is the label "Name" followed by a text input field containing the word "darkness". On the right of the bar is a blue button with the text "Press me".

TextFieldSoln

Hello, Chris
Hello, world
Hello, darkness

Name darkness Press me



Recall the Dancing Children

Normal Program

Run Method



Normal Program

Run Method



```
public void run() {  
    for(int i = 0; i < N_DRIBBLES; i++) {  
        dropOneDrizzle();  
    }  
}
```



Normal Program

Run Method



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



Normal Program

Run Method



New Listener Characters

Action Listener



Action Performed



Program Starts Running

Run Method

Action Performed



Add Action Listeners

Run Method

Action Performed

Action Listener



```
addActionListeners();
```

© 2009, CS100A, Stanford University



Program Runs as Usual

Run Method

Action Performed

Action Listener



Button Clicked!

Run Method

Action Performed

Action Listener



Calls Action Performed Method

Run Method

Action Performed

Action Listener



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



Calls Action Performed Method

Run Method

Action Performed

Action Listener



When done, Run continues.

Run Method

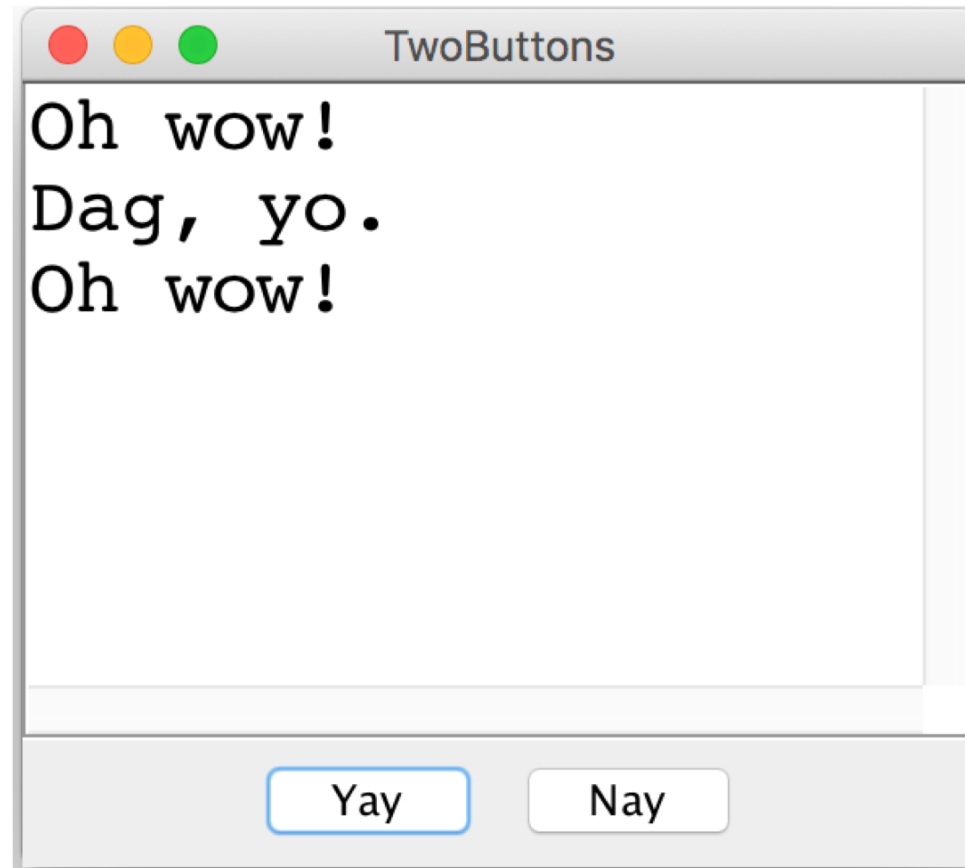
Action Performed

Action Listener



Recall the Dancing Children

Two Buttons



something awesome

*idea credits to Keith

The XKCD Color Survey



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

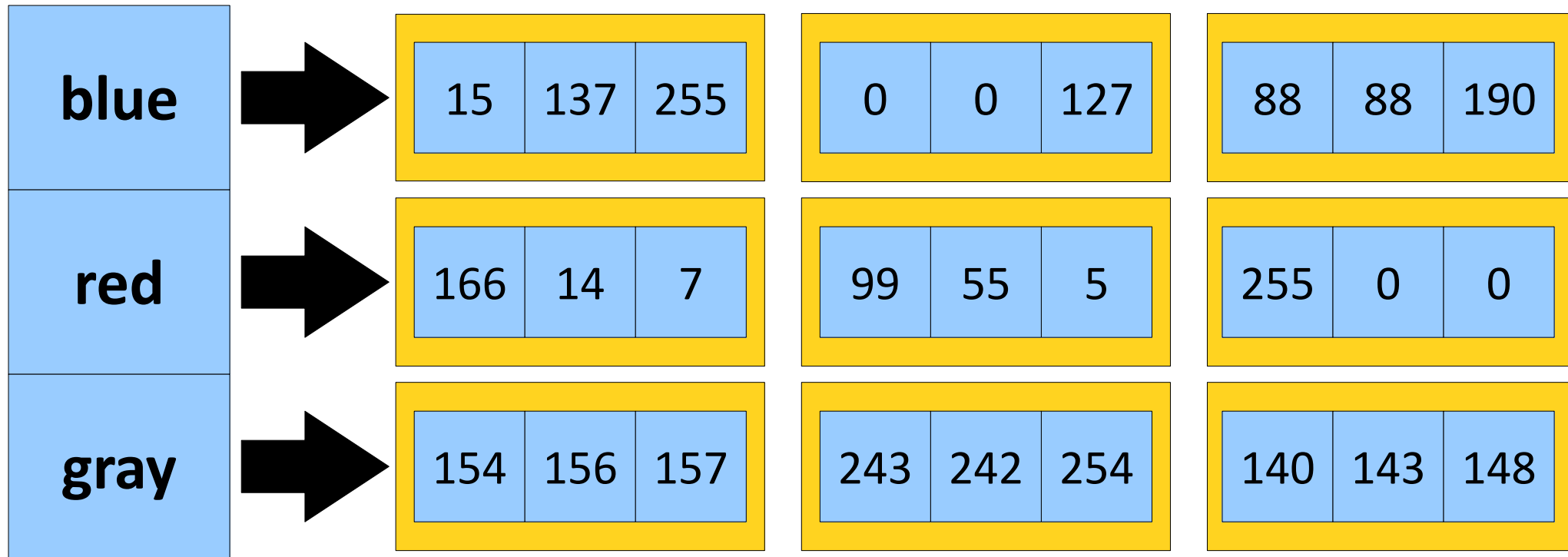
light purple
185
110
194
sea blue
24
250
209
navy blue
16
32
75
bluish green
62
208
104
dark blue
2
0
50
blue
107
148
220
dark blue
101
68
175
sky blue
7
152
170
teal
81
166

*color-name,
red,
green,
blue*

purple
130
64
234
blue
75
49
234
light blue
76
215
249
olive green
111
145
122
brown
88
70
1
pink
218
35
156
purple
154
42
159
purple
179
67
229
navy
92



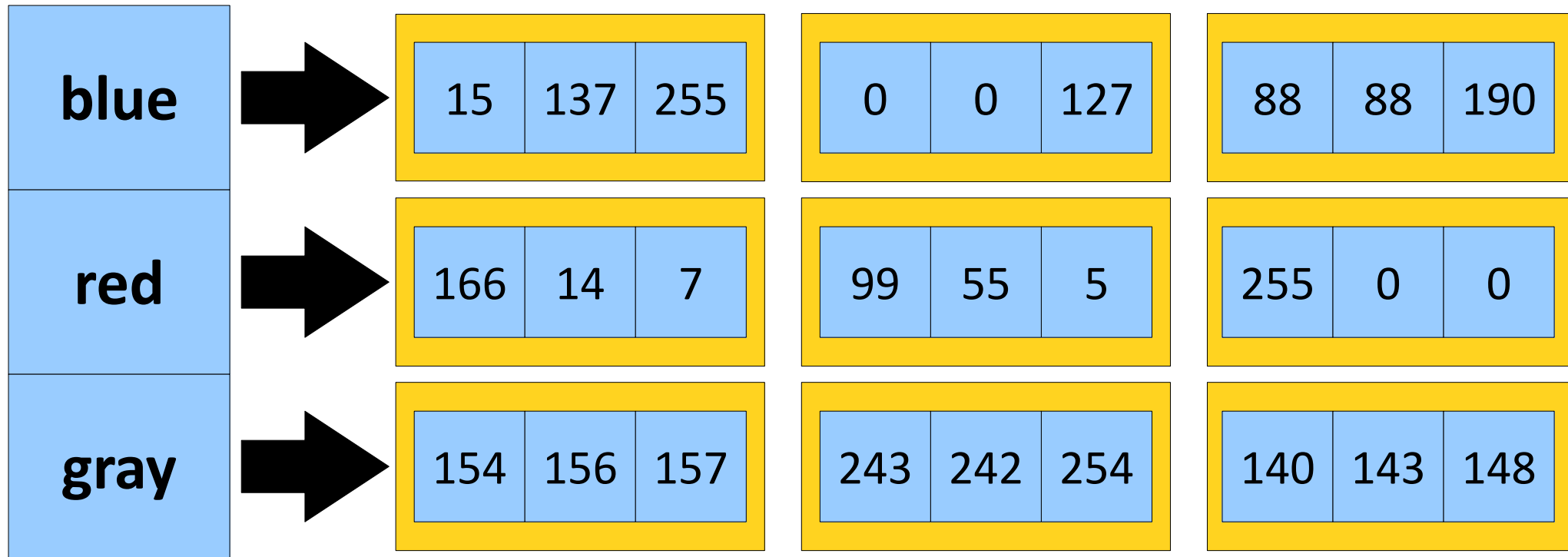
How to Structure Data



***associate each color name
with a list of colors***



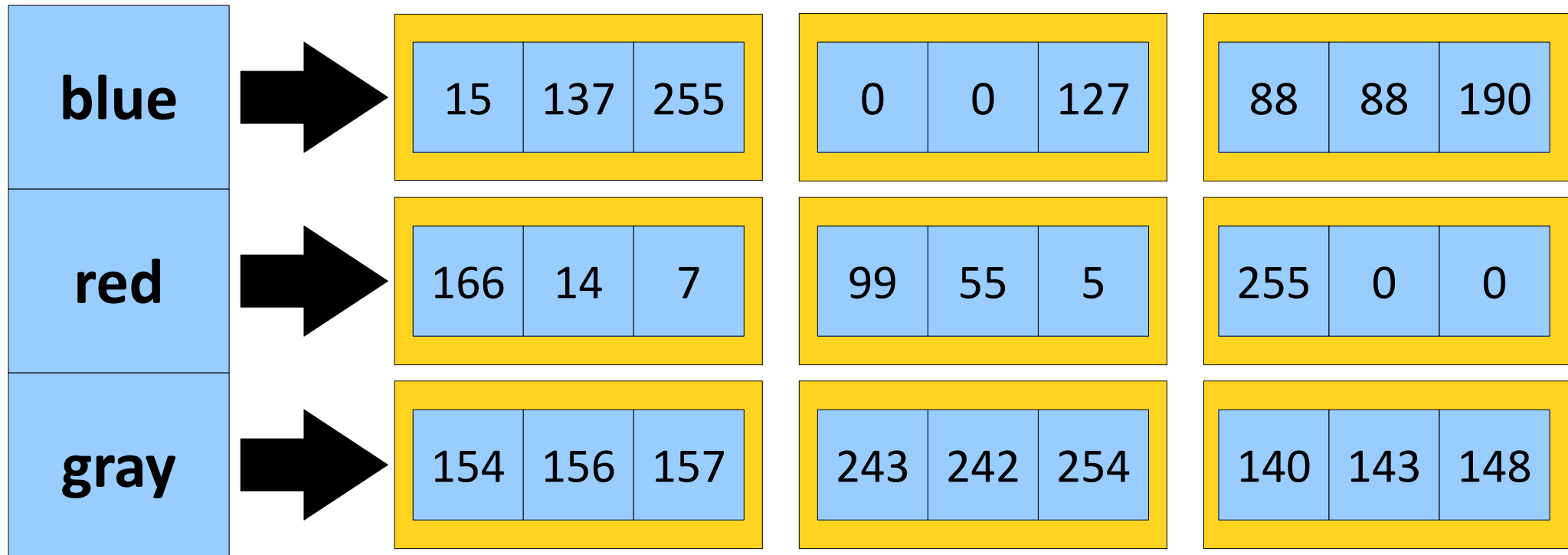
How to Structure Data



HashMap<*color name*, *list of colors*>



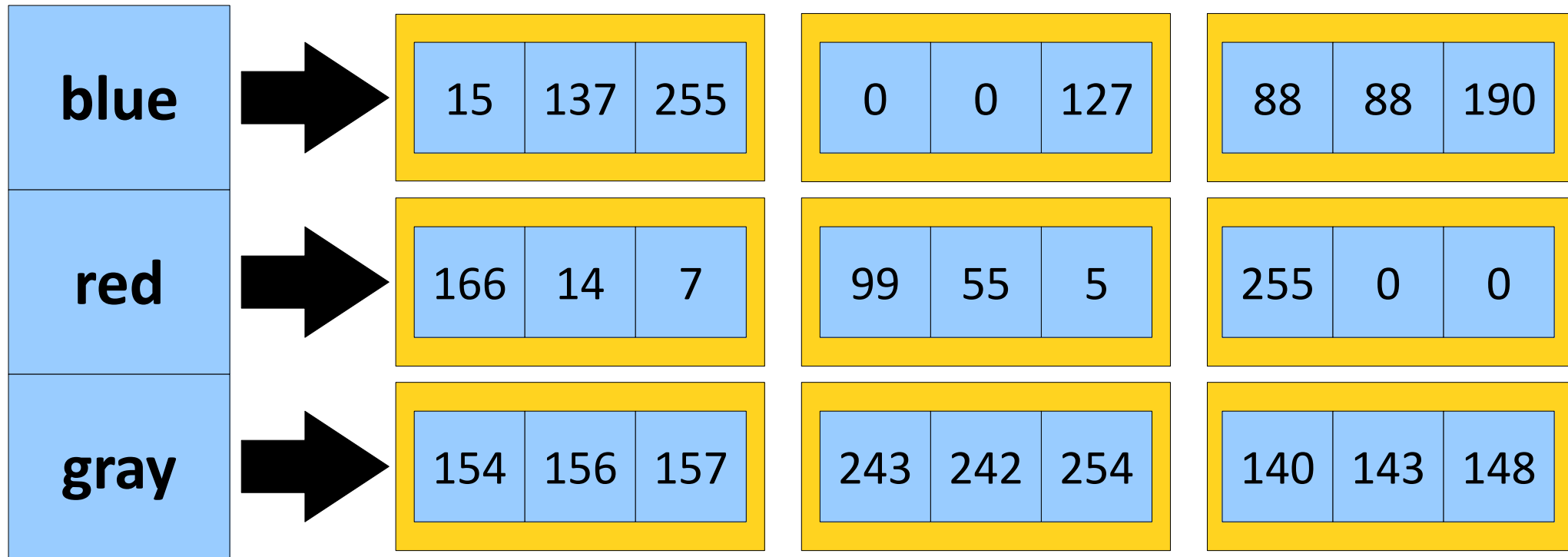
How to Structure Data



HashMap<String, *list of colors*>



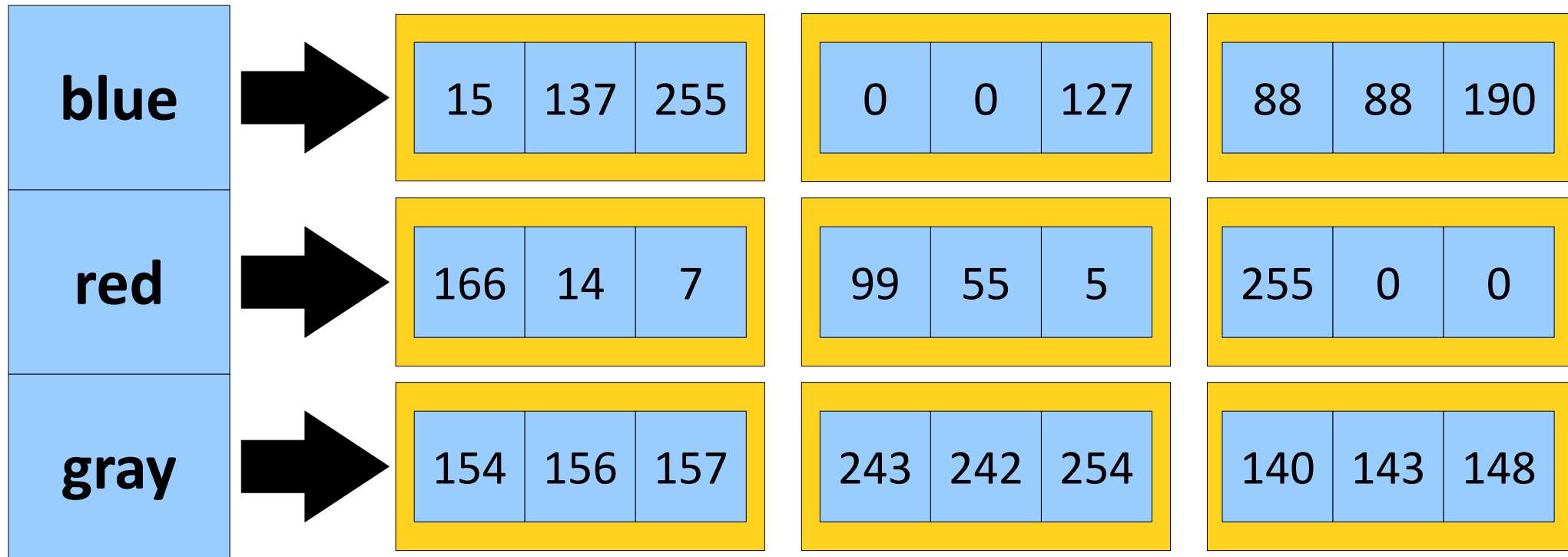
How to Structure Data



HashMap<String, ArrayList<color>>



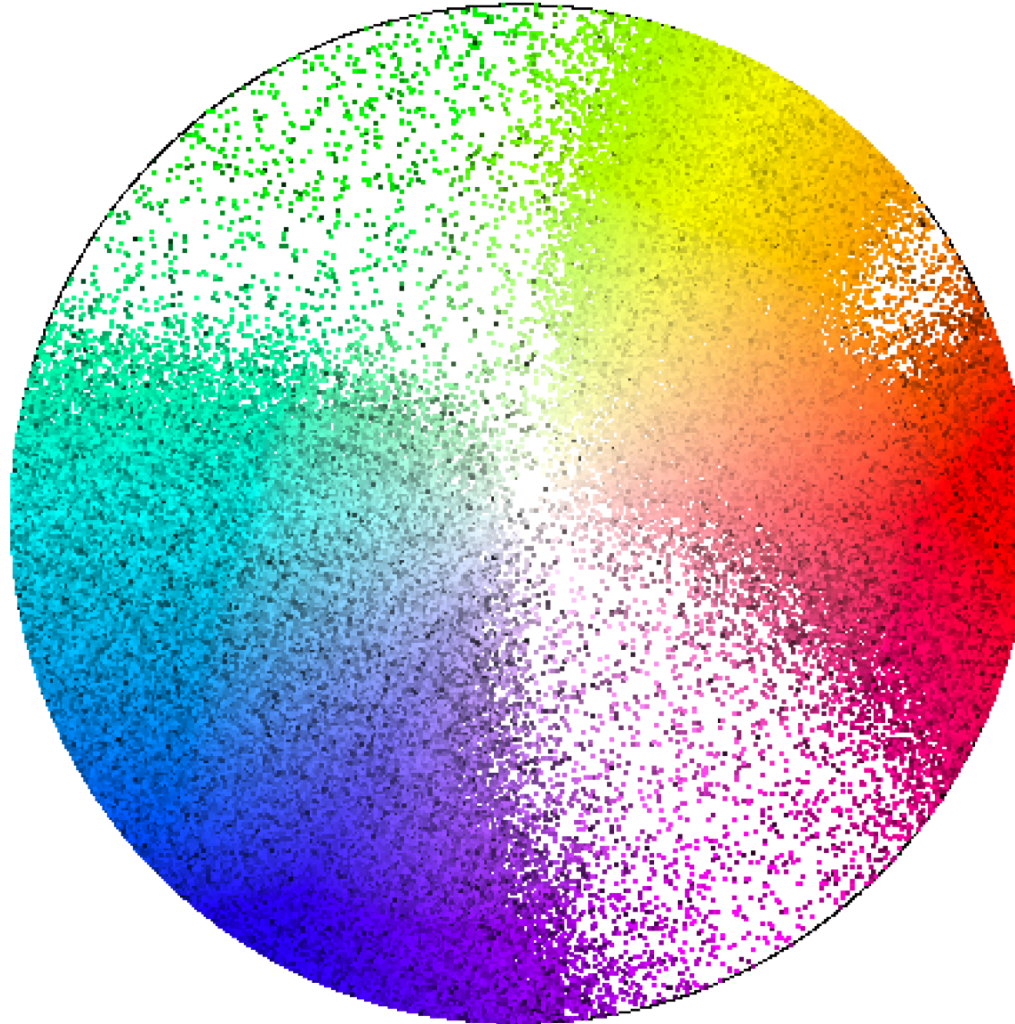
How to Structure Data



HashMap<String, ArrayList<Color>>



Displaying Colors



Further Reading

- <http://blog.xkcd.com/2010/05/03/color-survey-results/>

