

Advanced Maps and Interactors

Julia Daniel for Chris Piech
CS106A, Stanford University



You're not Chris...

HashMap Recap

key → value



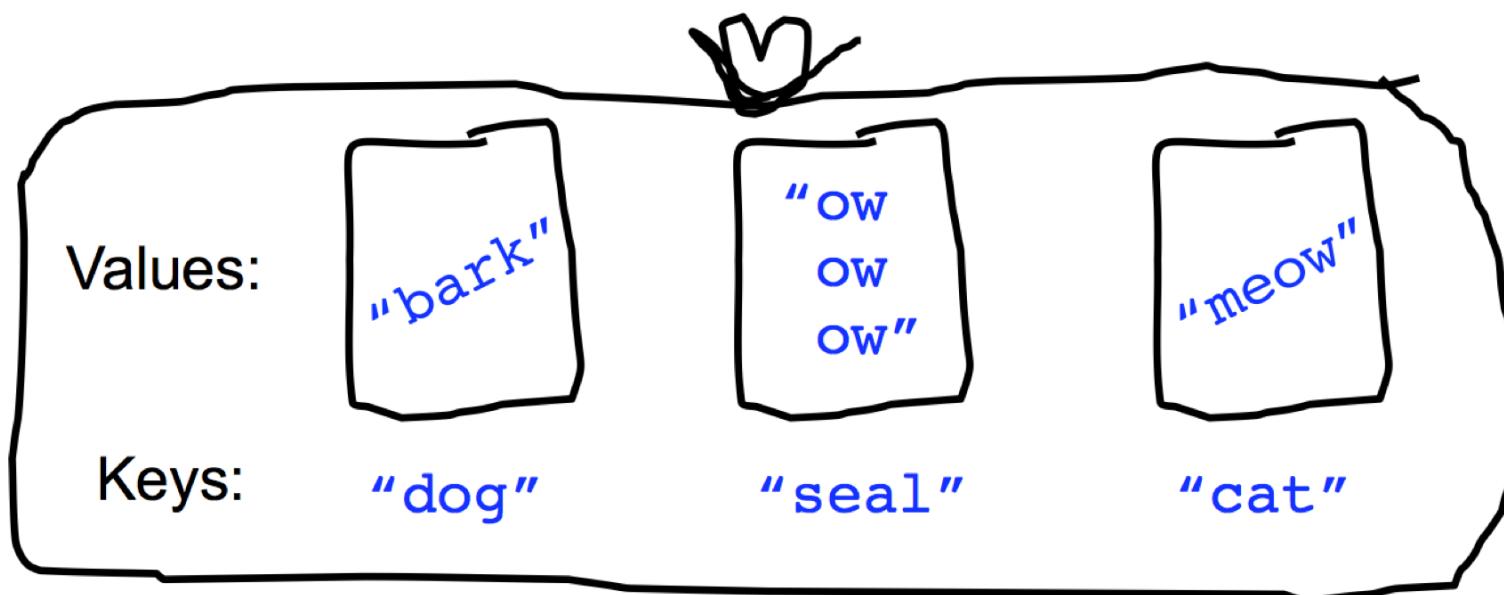
HashMap Recap

key



value

(String) animal → (String) animal sound

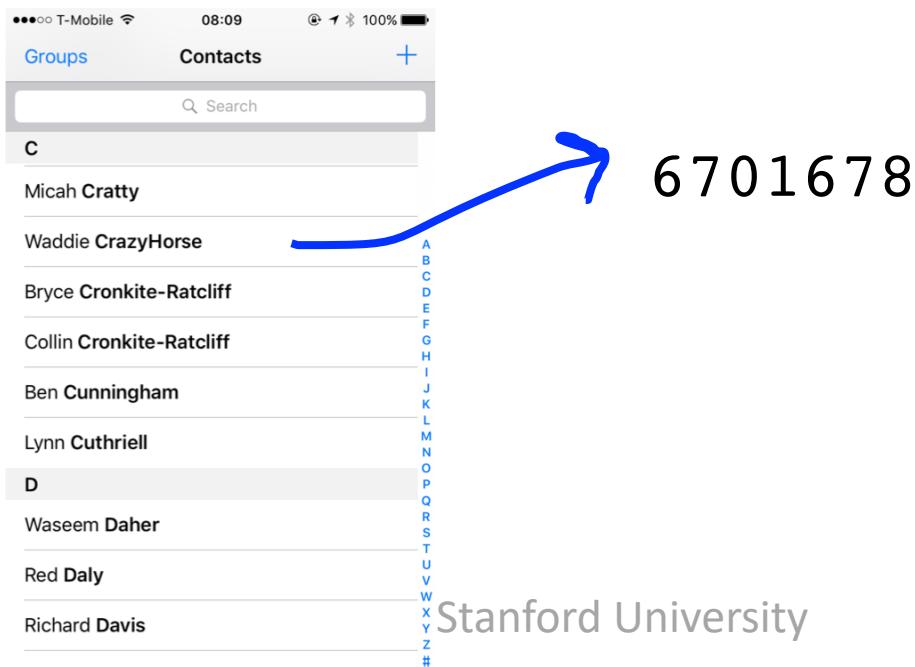


HashMap Recap

key → value

(String) animal → (String) animal sound

(String) name → (int) phone number



Stanford University



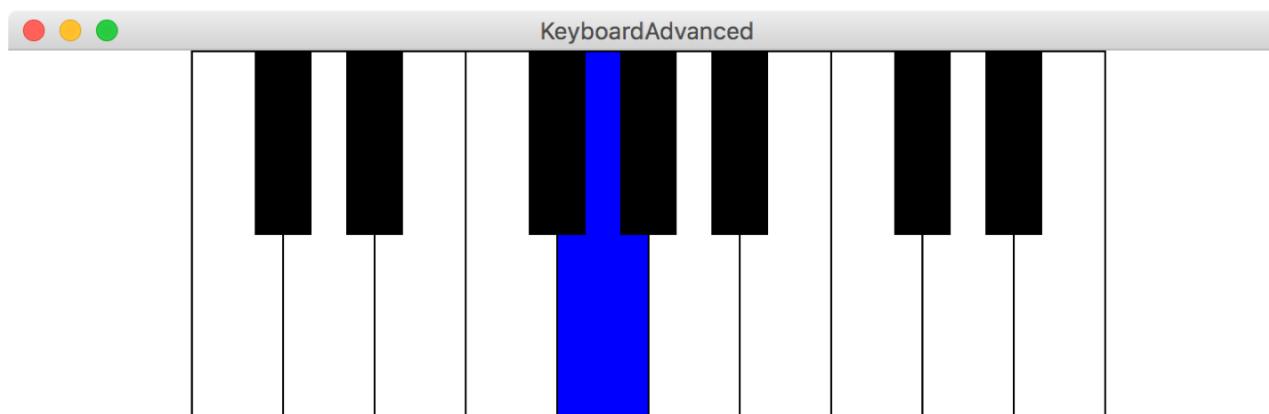
HashMap Recap

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.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

```
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 ...](http://www.sci-news.com/biology/science-color-vision-mantis-shrimp-01719.html)
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

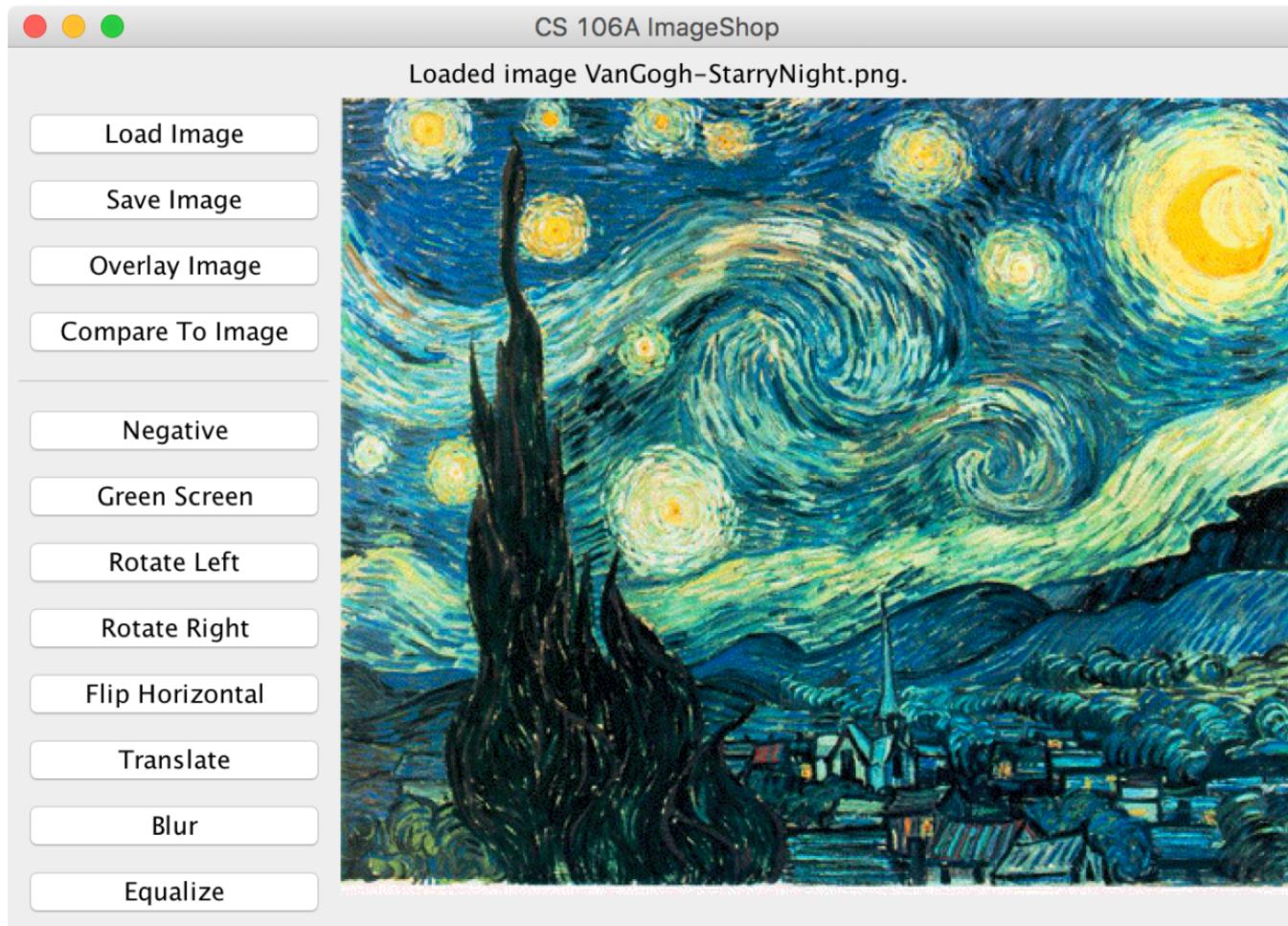


Look familiar?

Assignment 5: ImageShop

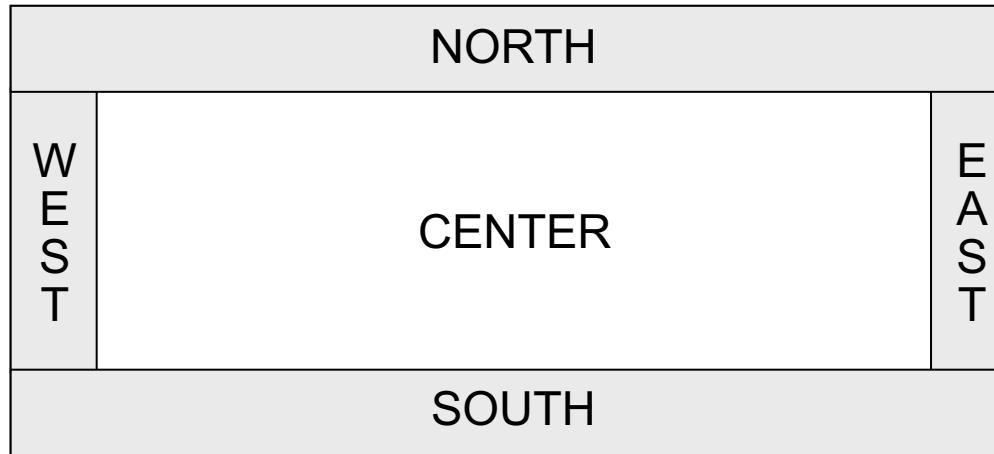
■ DUE: MONDAY, FEB 26TH, 11A.M.

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

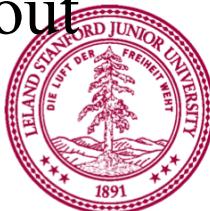


Adding Interactors

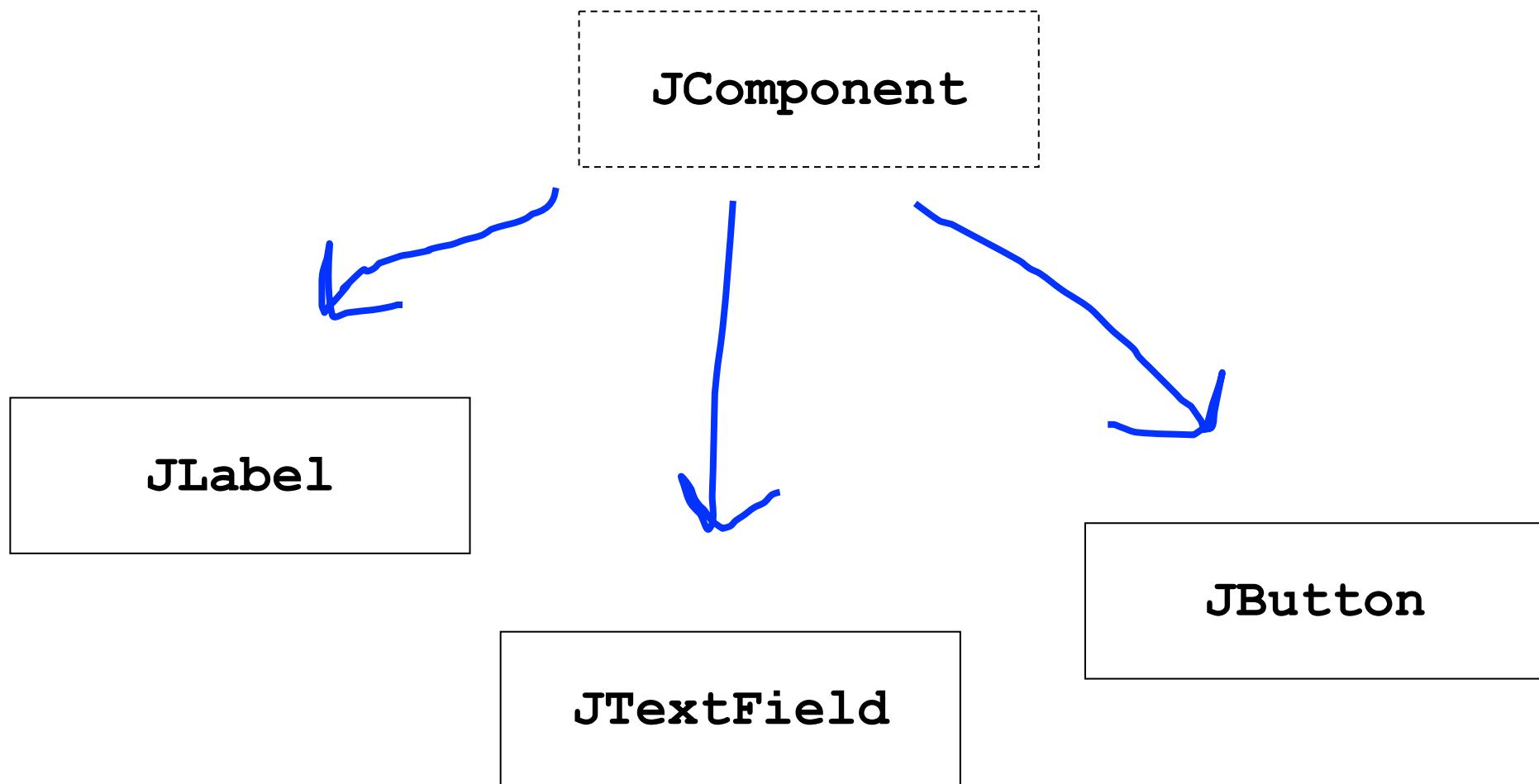
- When you create an instance of any **Program** subclass, Java divides the window area into five regions as follows:



- 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");
```



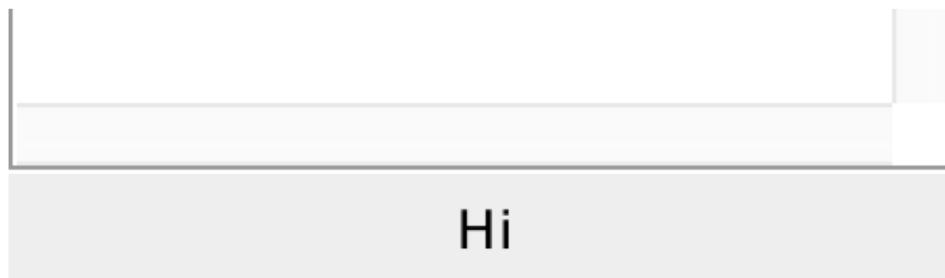
JLabel

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



JLabel

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



JTextField

JTextField

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



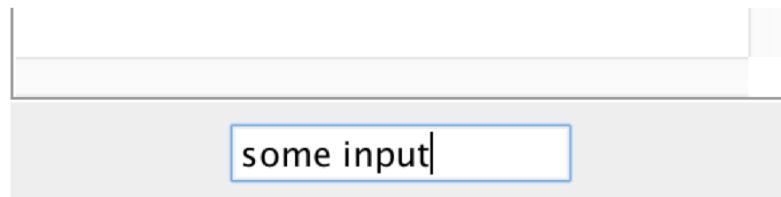
JTextField

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



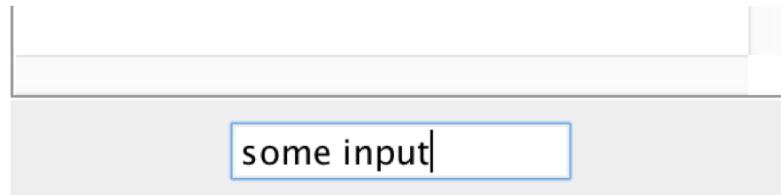
JTextField

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JTextField field = new JTextField(10);
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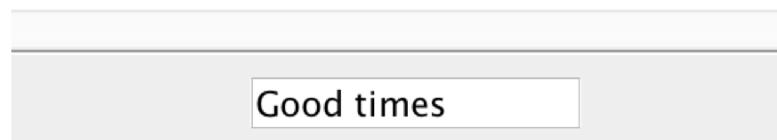
JTextField

```
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

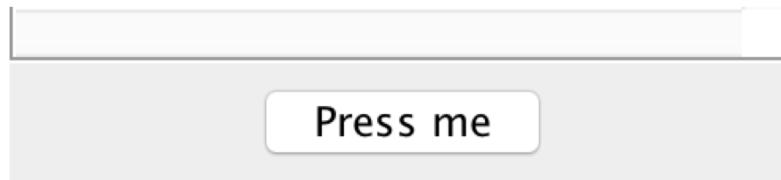


```
JButton button = new JButton("Press me");
```



JButton

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



JButton

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



All together now



TextFieldSoln

Hello, Chris
Hello, world
Hello, darkness

Name Press me



Recall the Dancing Children

Normal Program

Run Method



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Normal Program

Run Method



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



Normal Program

Run Method



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



Normal Program

Run Method



Piech, CS106A, Stanford University



New Listener Characters

Action Listener



Action Performed



Program Starts Running

Run Method



Action Performed



Piech, CS106A, Stanford University



Add Action Listeners

Run Method



Action Performed



Action Listener



`addActionListeners();`

Presented by Stanford University



Program Runs as Usual

Run Method



Action Performed



Action Listener



Button Clicked!

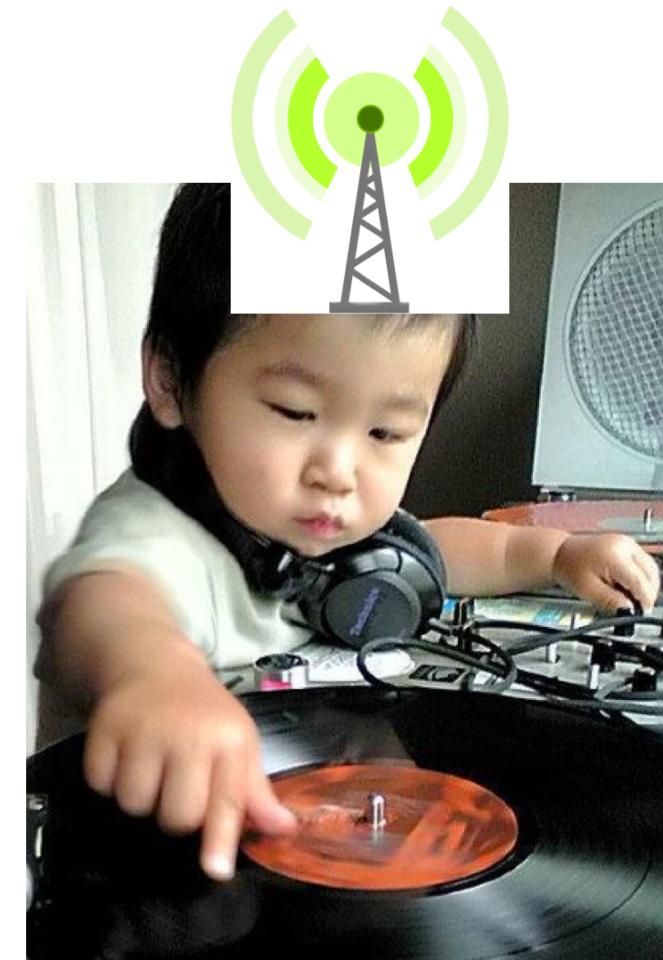
Run Method



Action Performed



Action Listener



Calls Action Performed Method

Run Method



Action Performed



Action Listener



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



Calls Action Performed Method

Run Method



Action Performed



Action Listener



Piech, CS106A, Stanford University



When done, Run continues.

Run Method



Action Performed

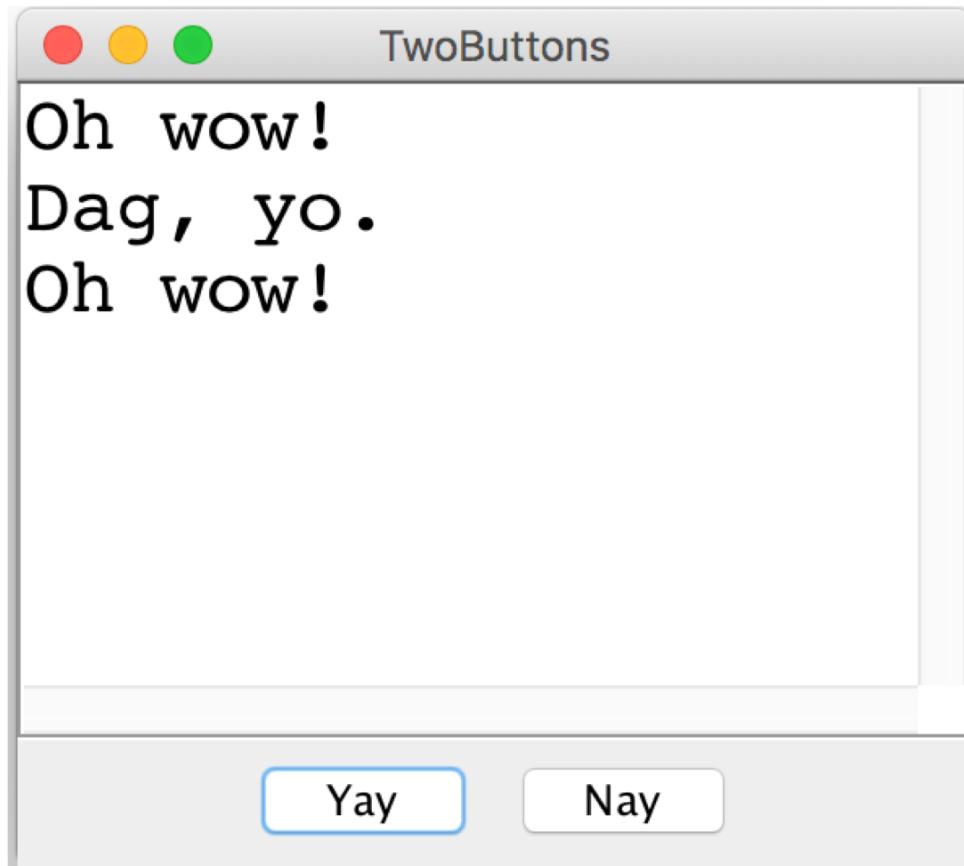


Action Listener



Recall the Dancing Children

Two Buttons



something awesome

*idea credits to Keith

The XKCD Color Survey



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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?



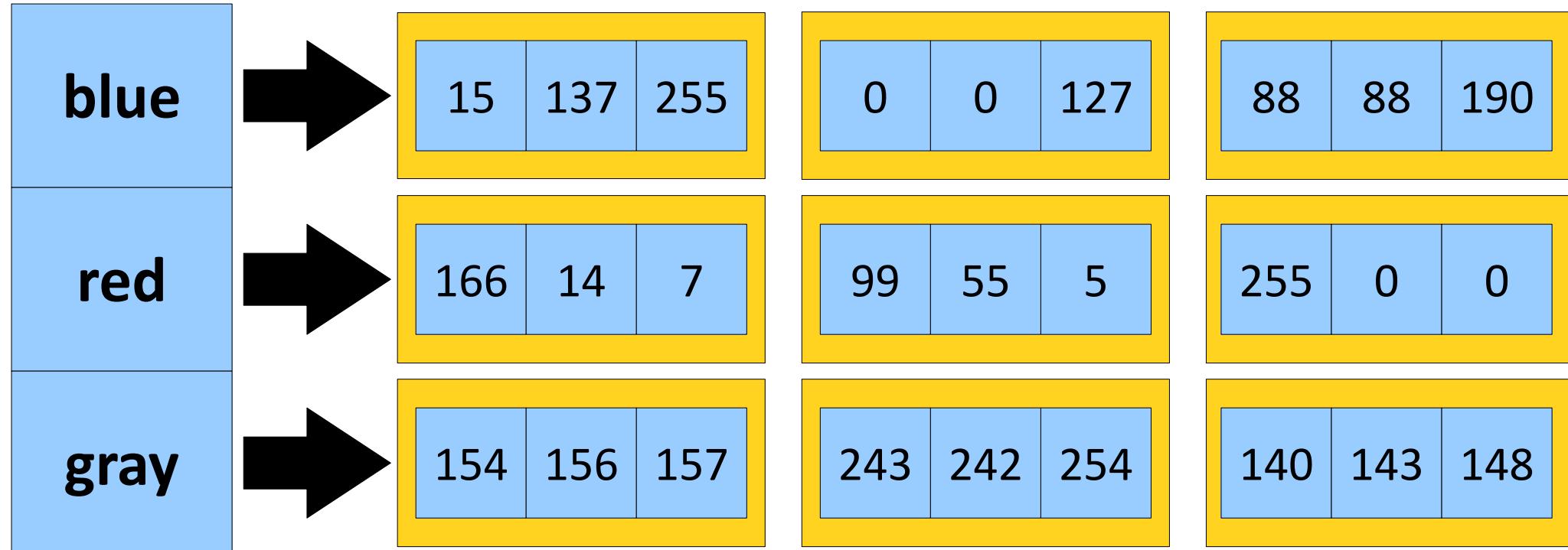
The File Format

light purple		purple
185		130
110		64
194		234
sea blue		blue
24		75
250		49
209		234
navy blue		light blue
16		76
32		215
75		249
bluish green		olive green
62		111
208		145
104		122
dark blue		brown
2		88
0		70
50		1
blue		pink
107		218
148		35
220		156
dark blue		purple
101		154
68		42
175		159
sky blue		purple
7		179
152		67
170		229
teal		navy
81		92
166		

color-name,
red,
green,
blue



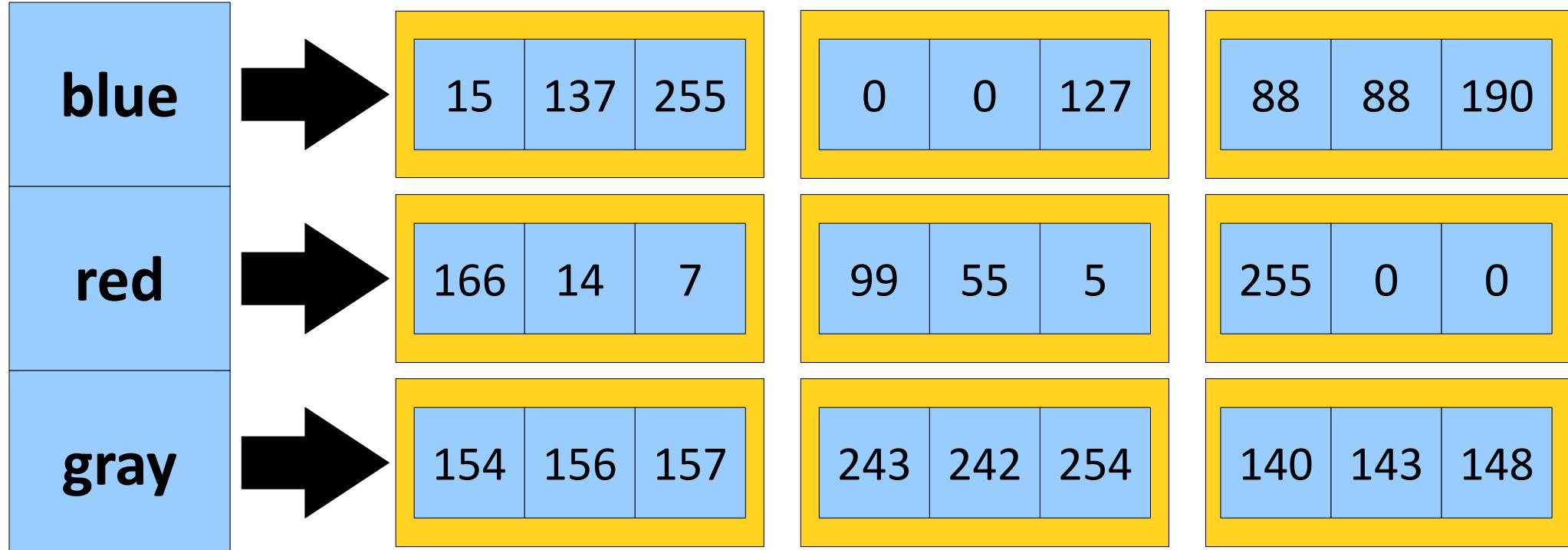
How to Structure Data



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



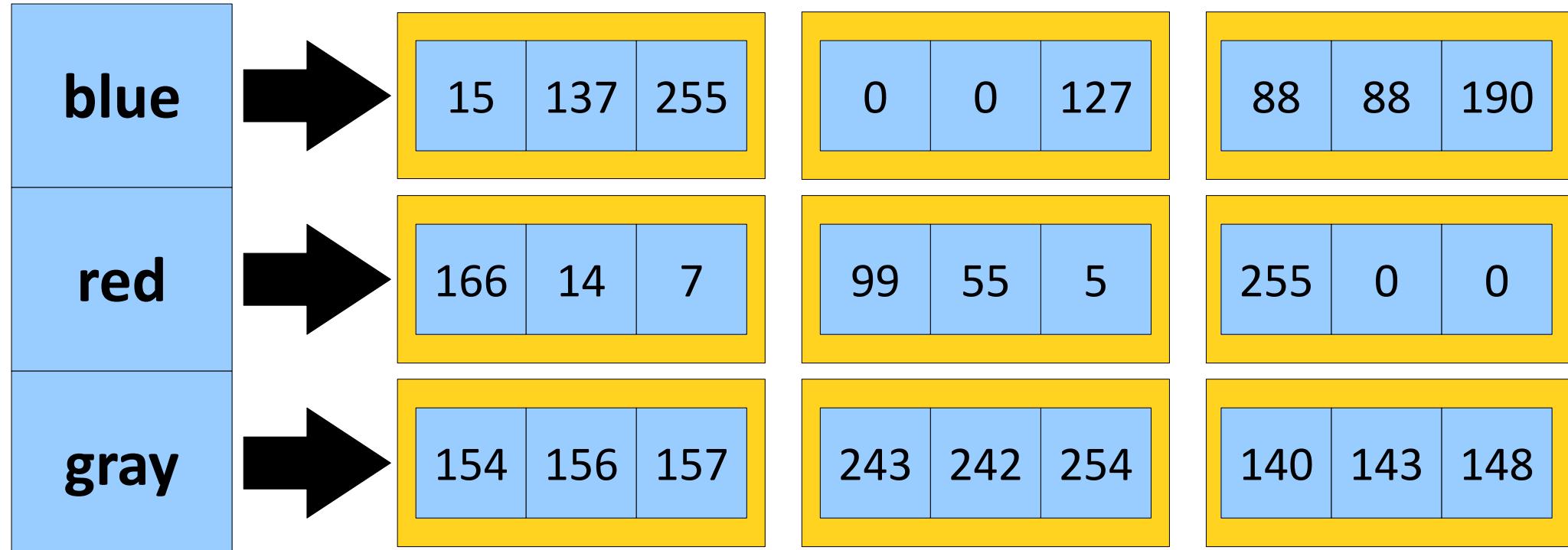
How to Structure Data



HashMap<color name , *list of colors*>



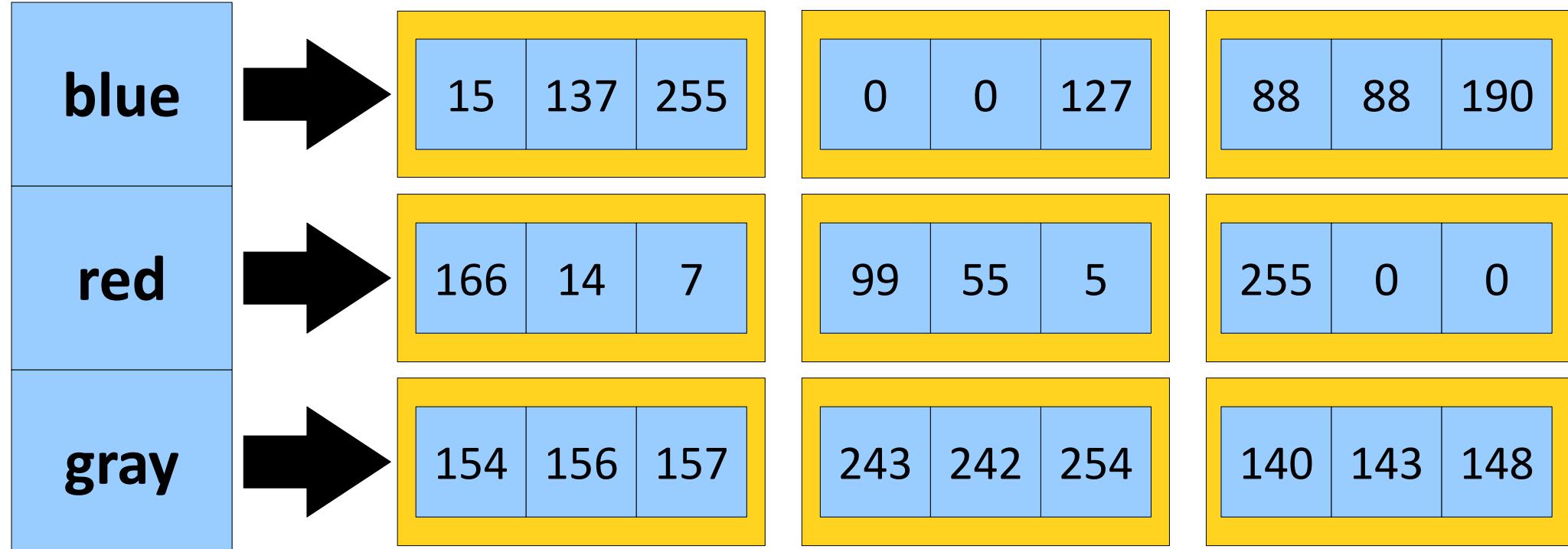
How to Structure Data



HashMap<String, *list of colors*>



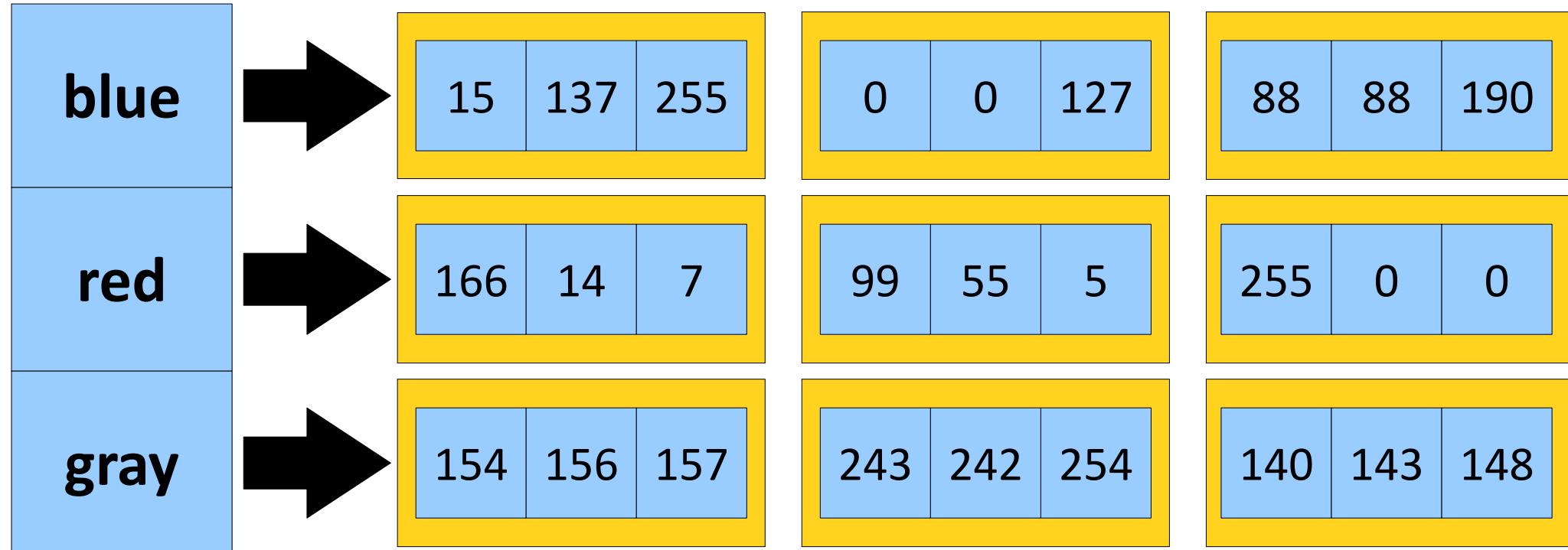
How to Structure Data



`HashMap<String, ArrayList<color>>`



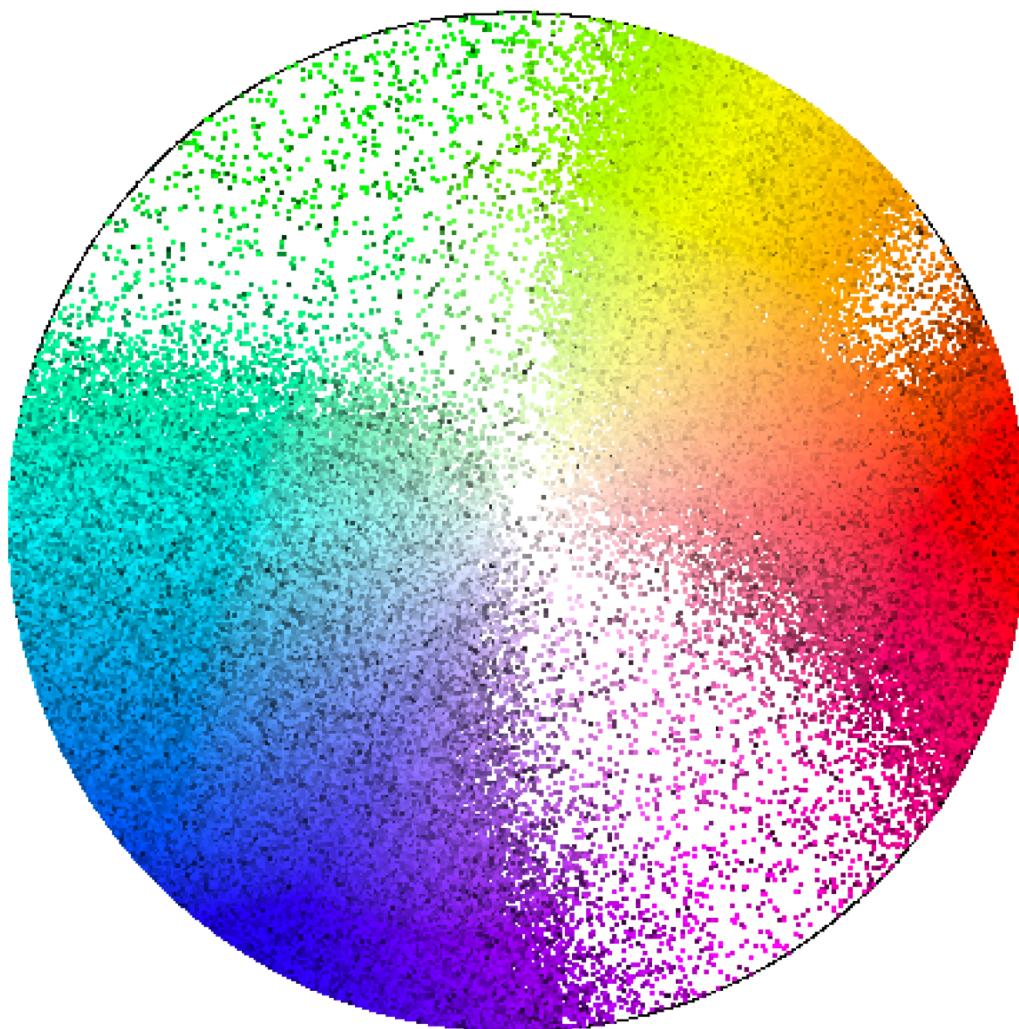
How to Structure Data



HashMap<String, ArrayList<Color>>



Displaying Colors



peach

Graph

Clear



Further Reading

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

