Advanced Maps

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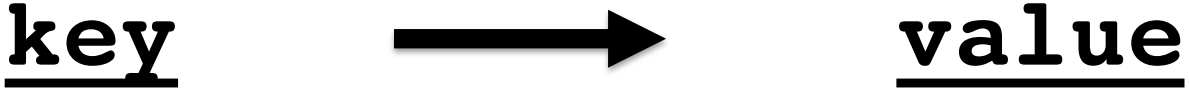
You’re not Chris…

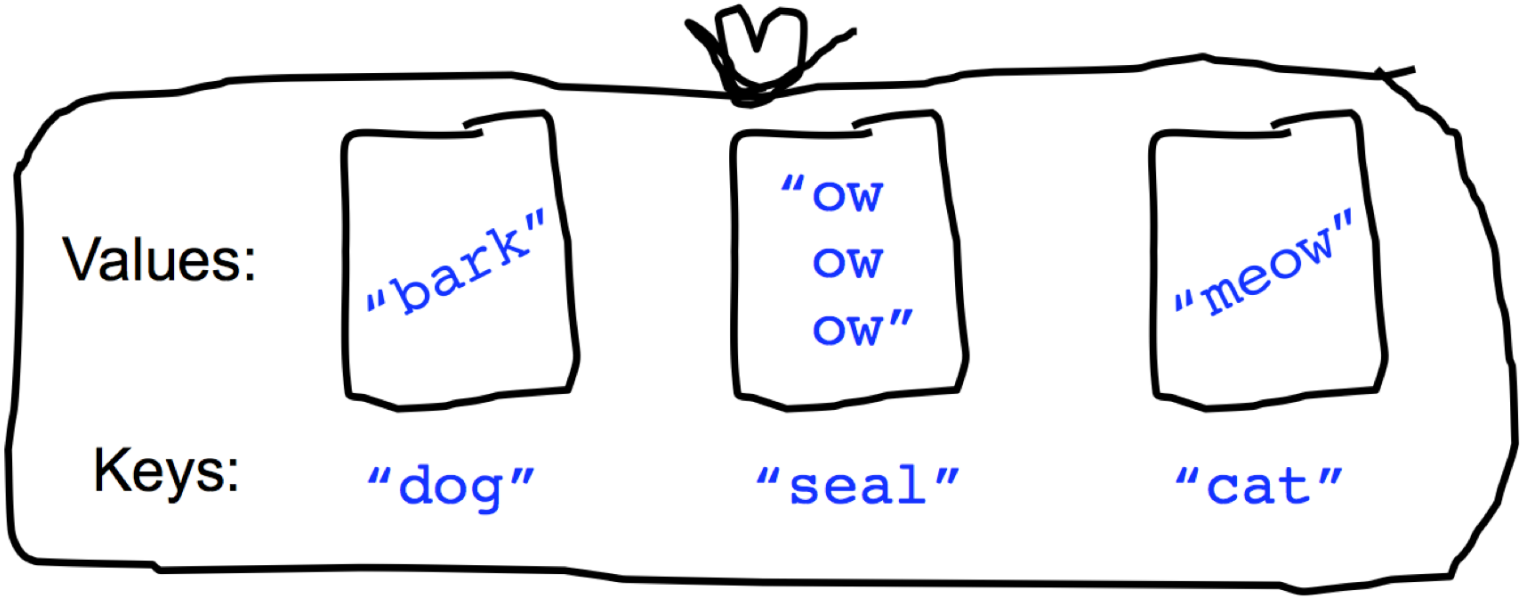
HashMap Recap



HashMap Recap

`key` → **`value`**

(`String`) animal → (`String`) animal sound

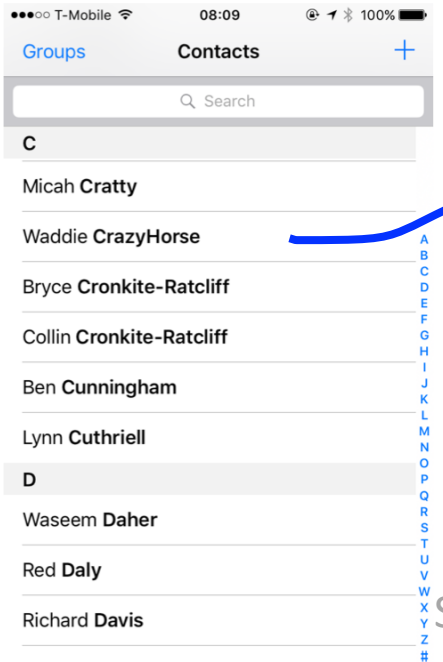


HashMap Recap

key → **value**

(String) animal → (String) animal sound

(String) name → (int) phone number



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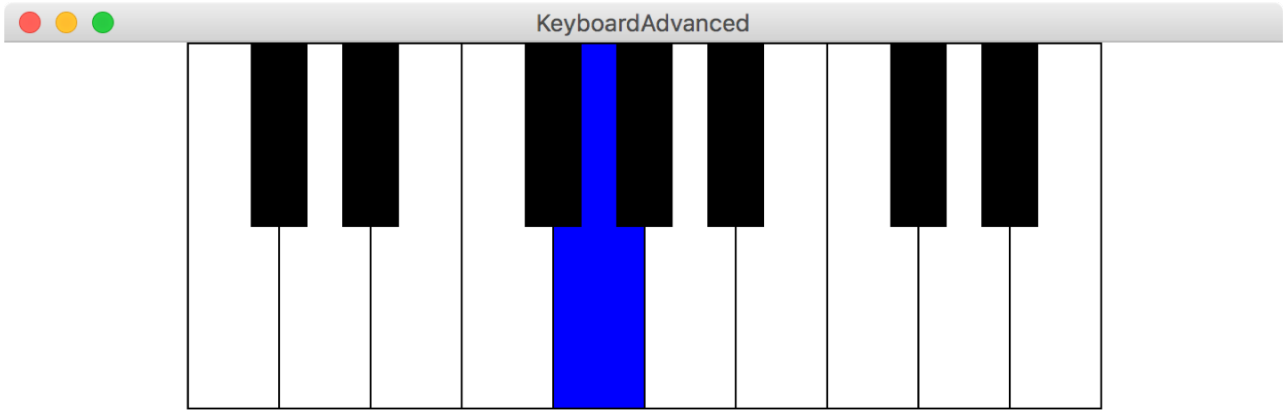
HashMap Recap

`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?

Google

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?

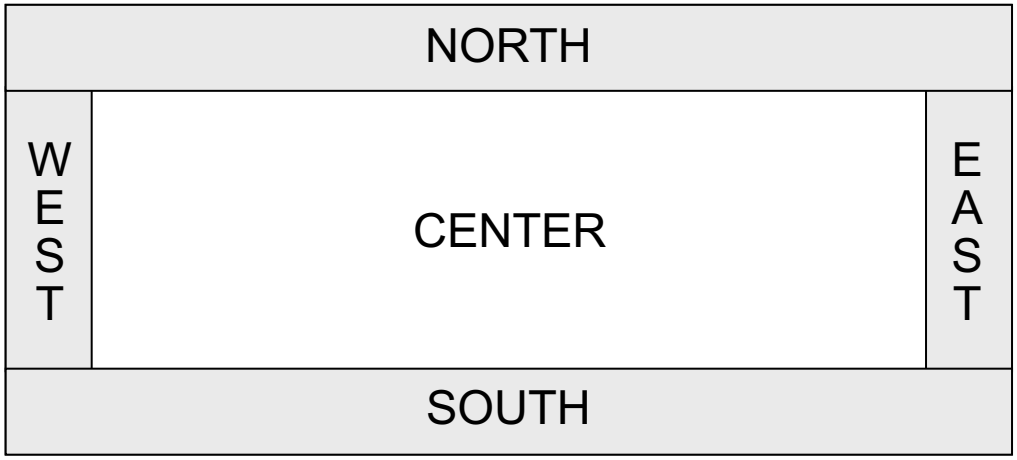
- Karel the Robot
- Java
- Console Programs
- Graphics Programs
- Text Processing
- Data Structures
- **GUIs**
- Defining our own Variable Types

Button

Button

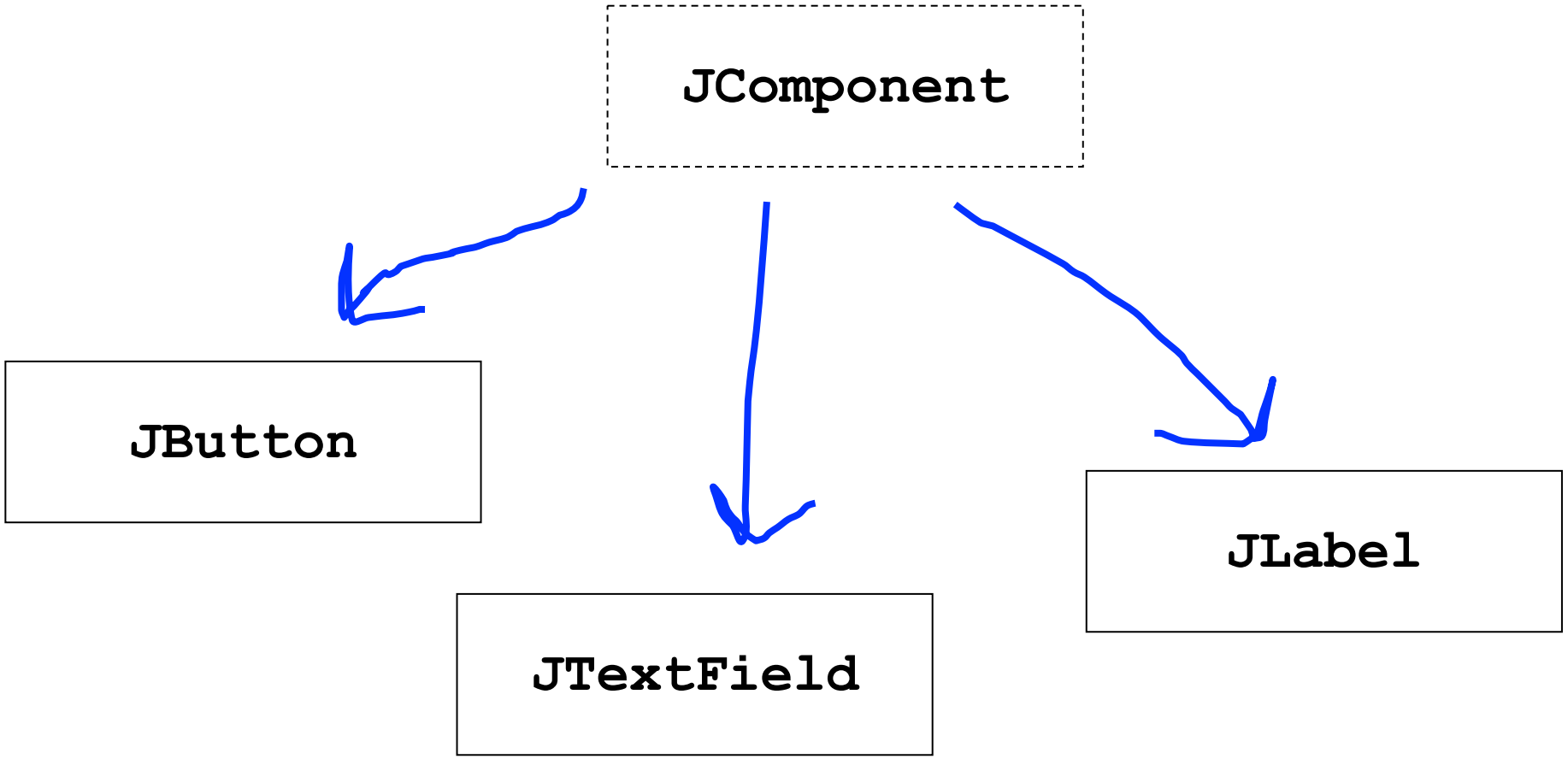
Adding Iteractors

- 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



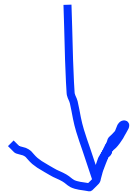
JButton

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());
}
```


JLabel

JLabel

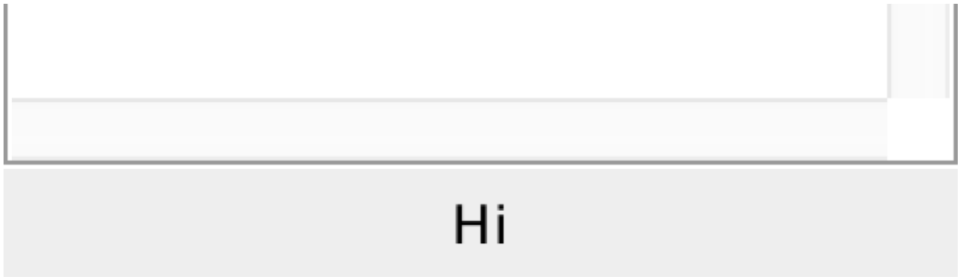
```
JLabel label = new JLabel("Hi");
```


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");
```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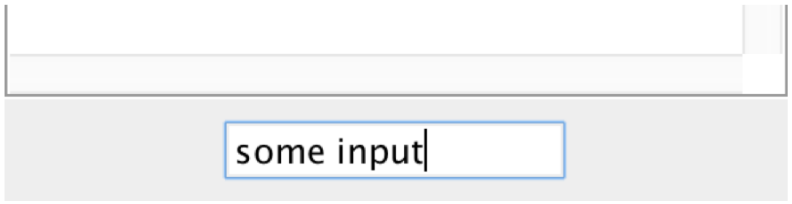
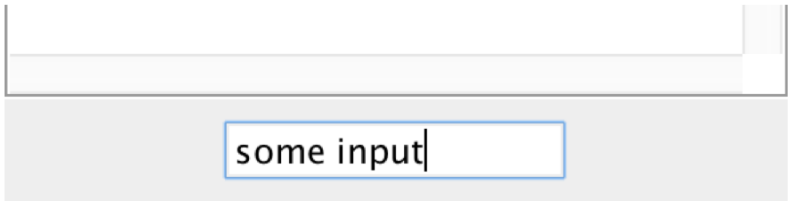


JTextField

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



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JTextField field = new JTextField(10);
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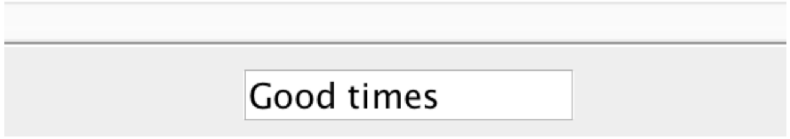


Recall the Dancing Children

Normal Program

Run Method

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

New Listener Characters

Action Listener

Action Performed

Program Starts Running

Run Method

Action Performed

Add Action Listeners

Run Method

Action Performed

Action Listener

```
addActionListeners();
```

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.

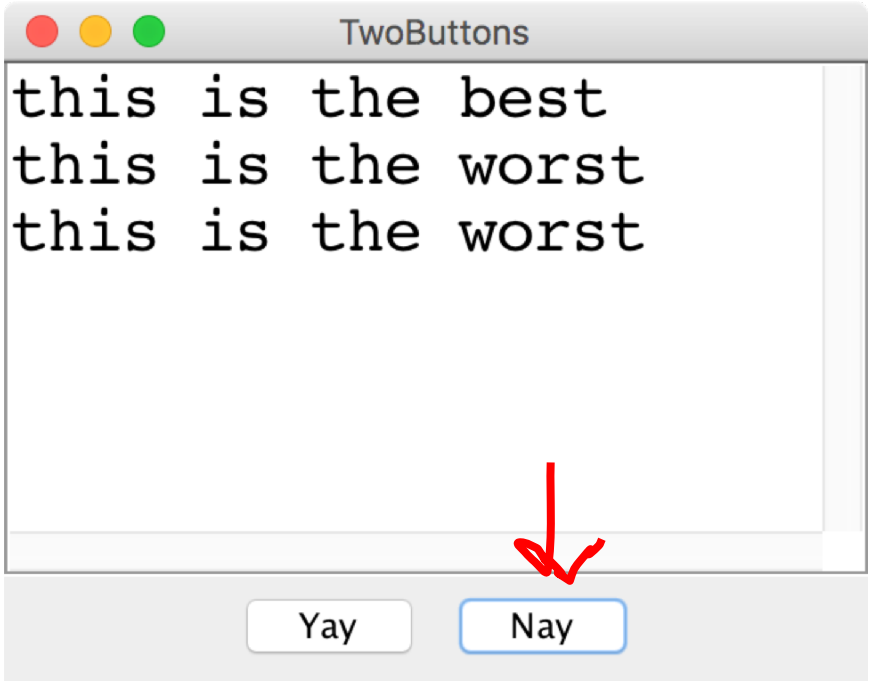
Run Method

Action Performed

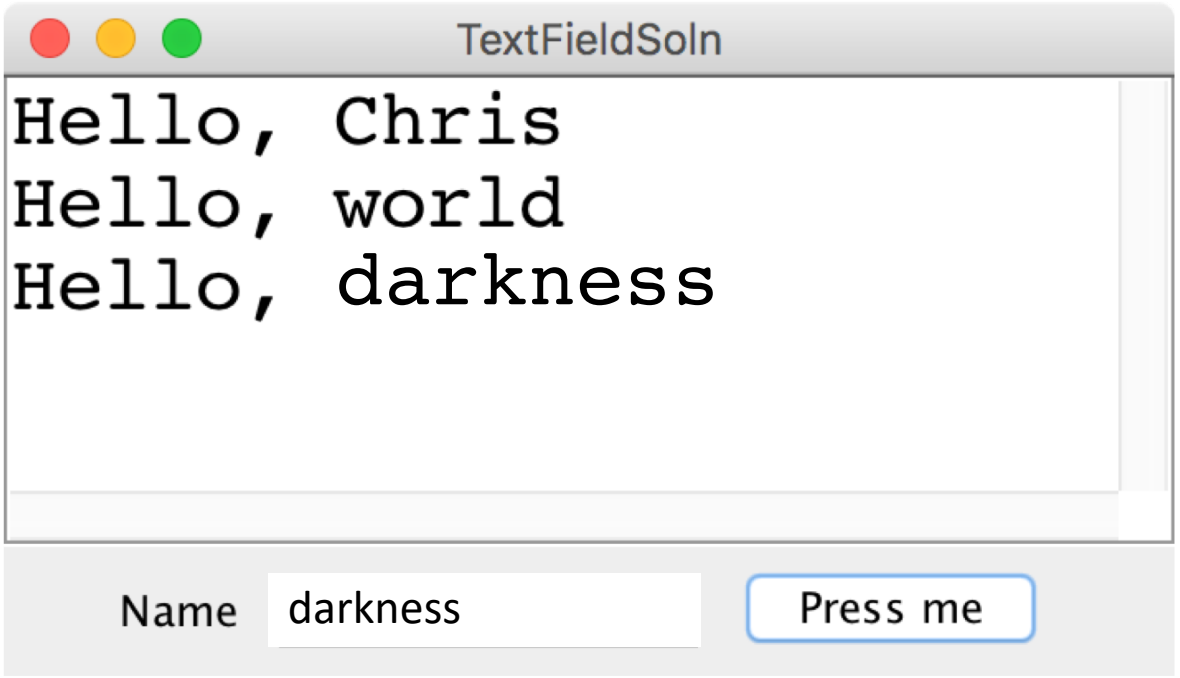
Action Listener

Recall the Dancing Children

Two Buttons


TwoButtons
this is the best
this is the worst
this is the worst
Yay
Nay

Text Field


TextFieldSoln
Hello, Chris
Hello, world
Hello, darkness
Name
darkness
Press me

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

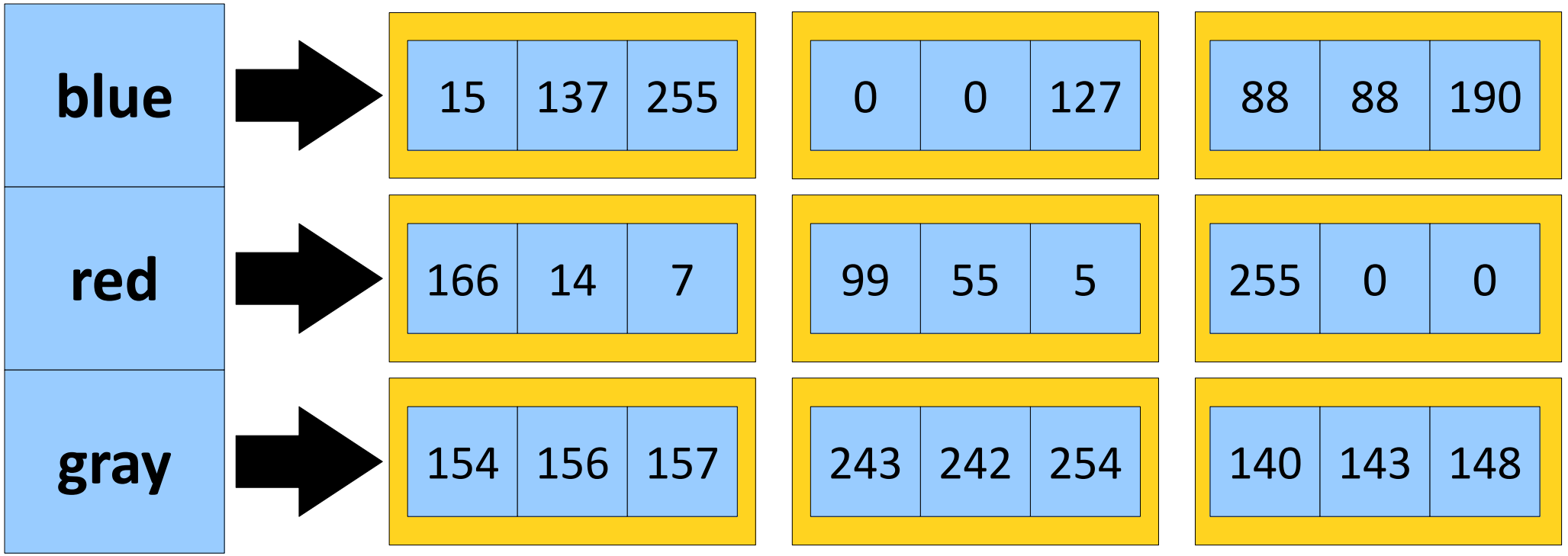
color-name,

red,

green,

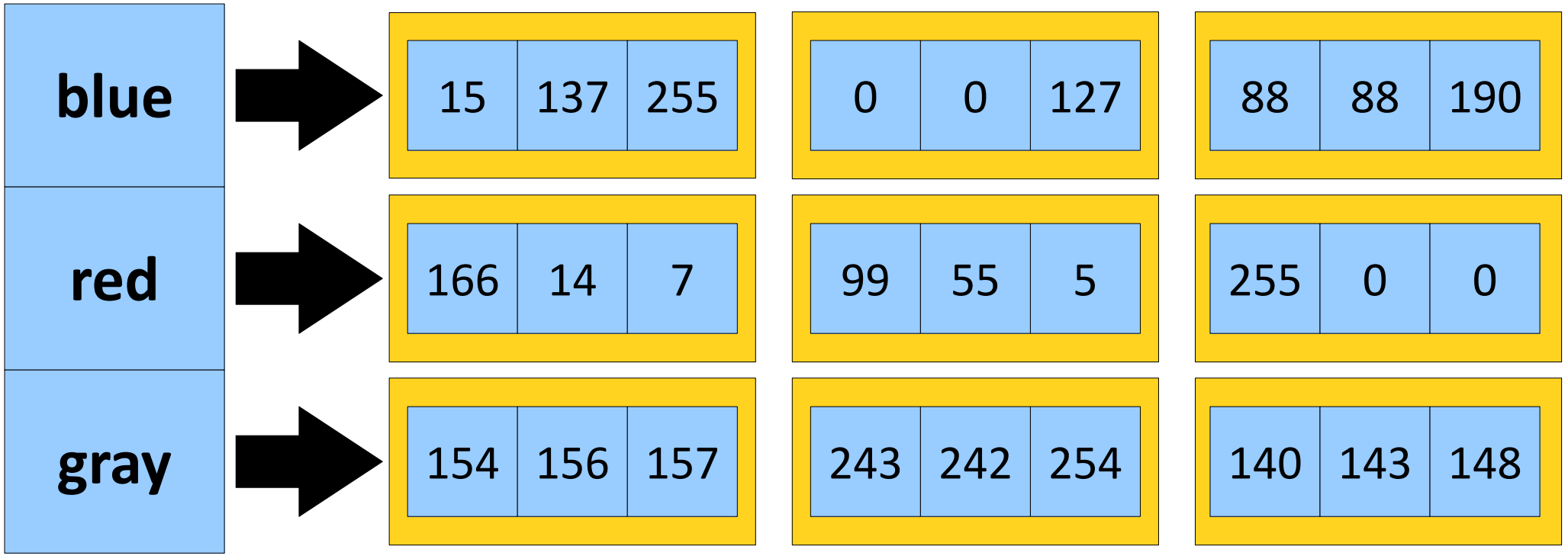
blue

How to Structure Data



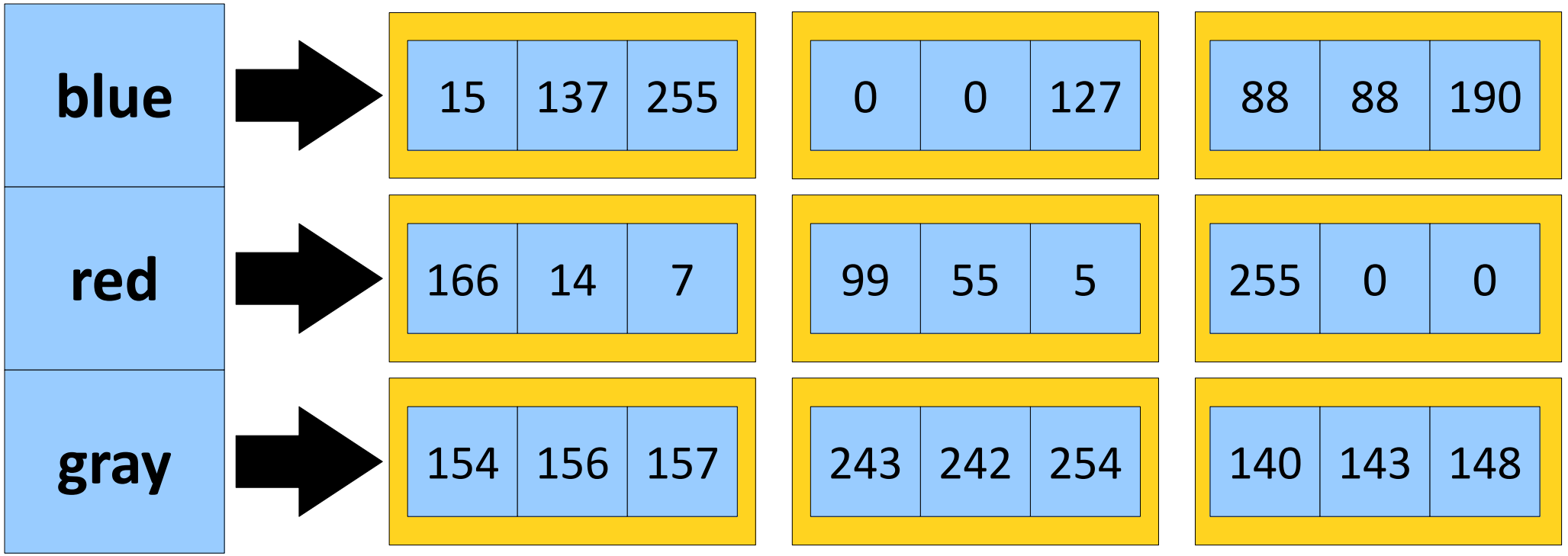
associate each color name with a list of colors

How to Structure Data



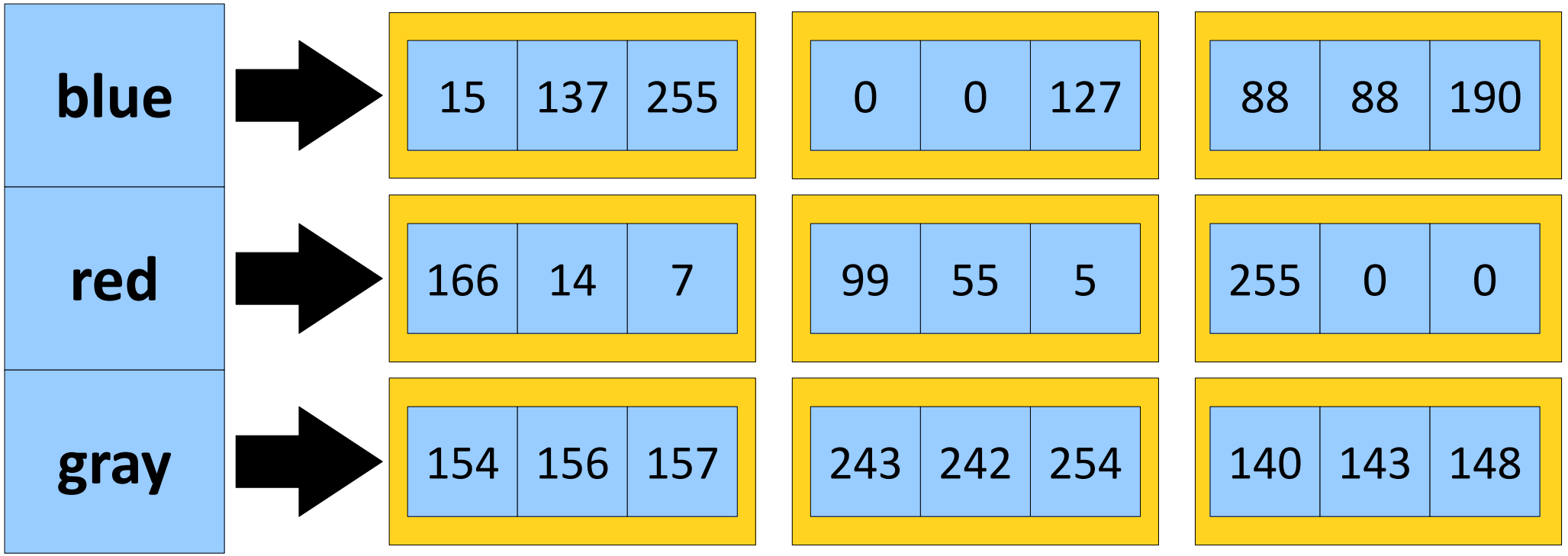
`HashMap<`*color name*`,` *list of colors*`>`

How to Structure Data



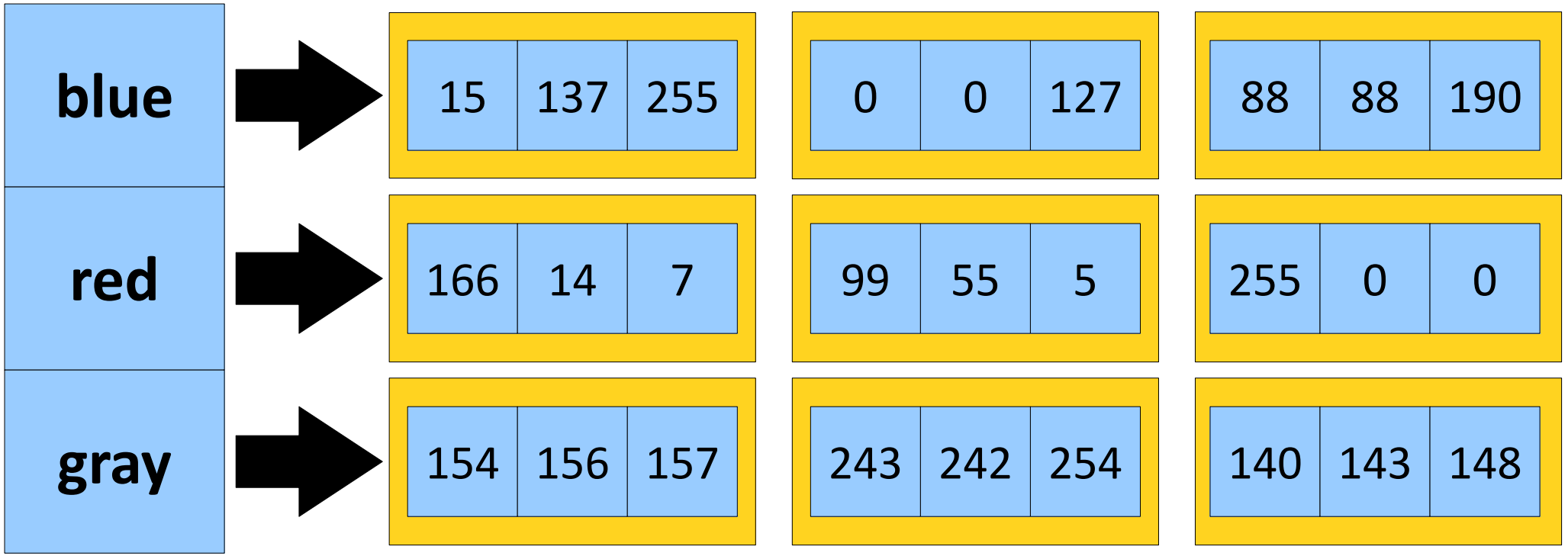
`HashMap<String,` ***list of colors***`>`

How to Structure Data



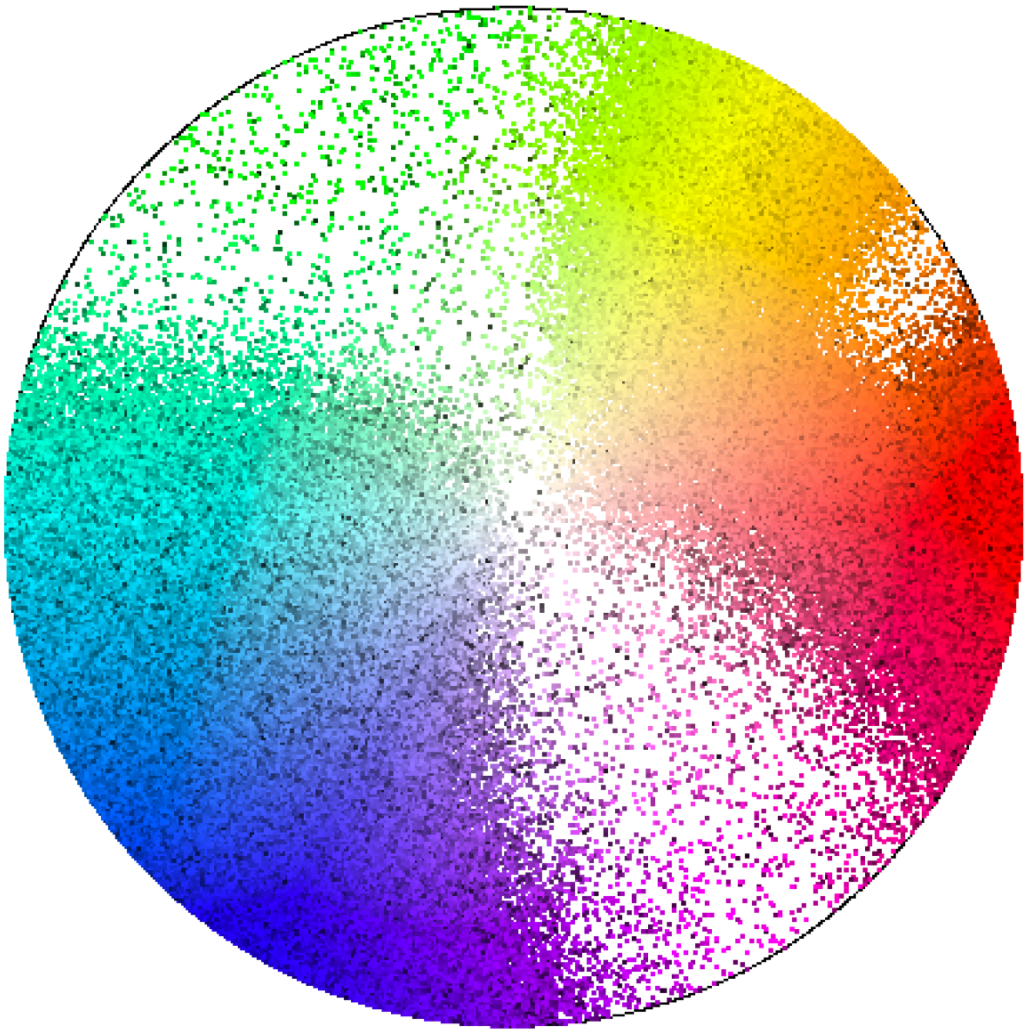

```
HashMap<String, ArrayList<color>>
```

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/