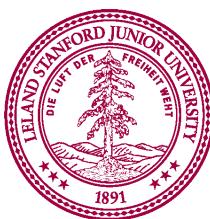


# Life After CS106A

Chris Piech  
CS106A, Stanford University

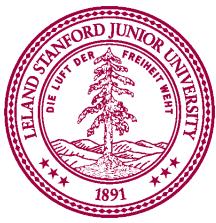
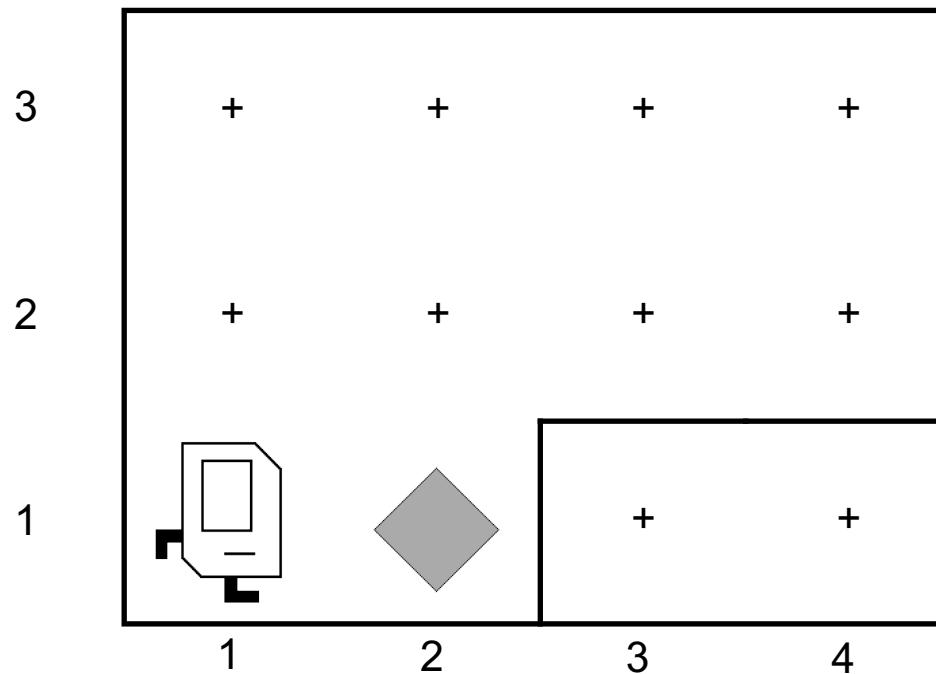
Piech, CS106A, Stanford University



# FacePamphlet

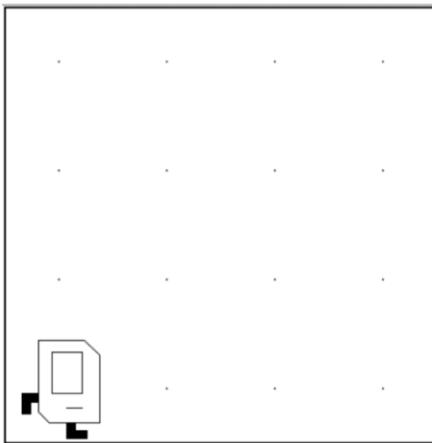
# The Final

# First day

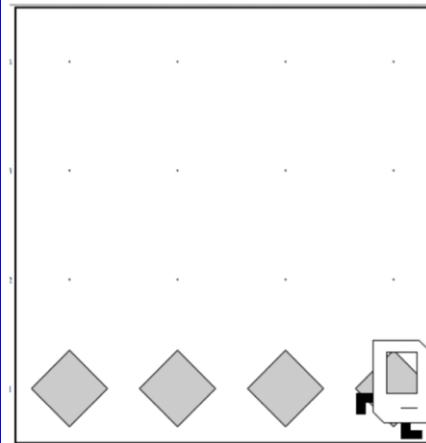


# Work in Any World

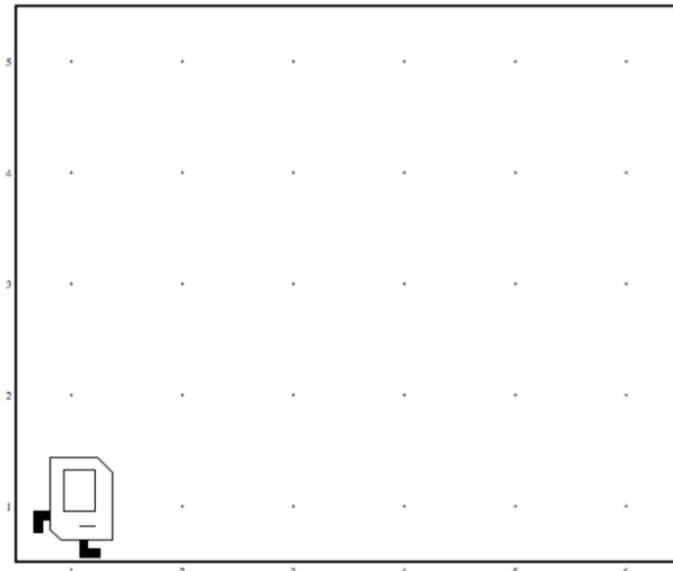
Before



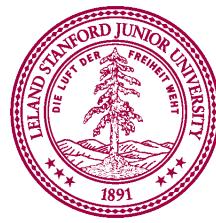
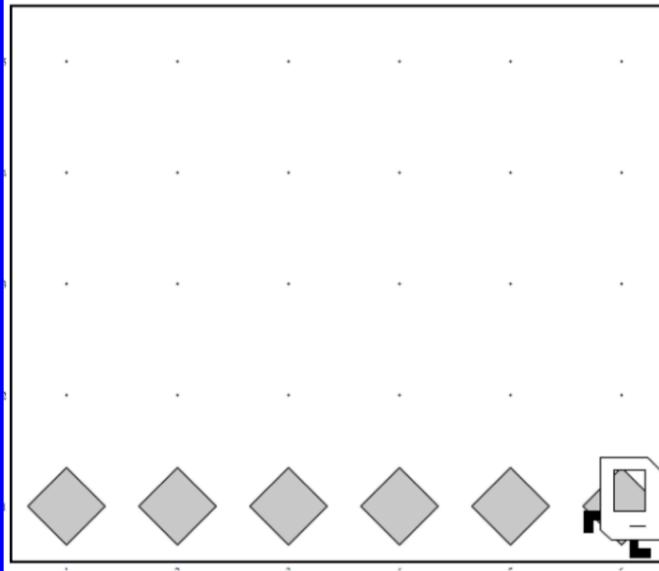
After

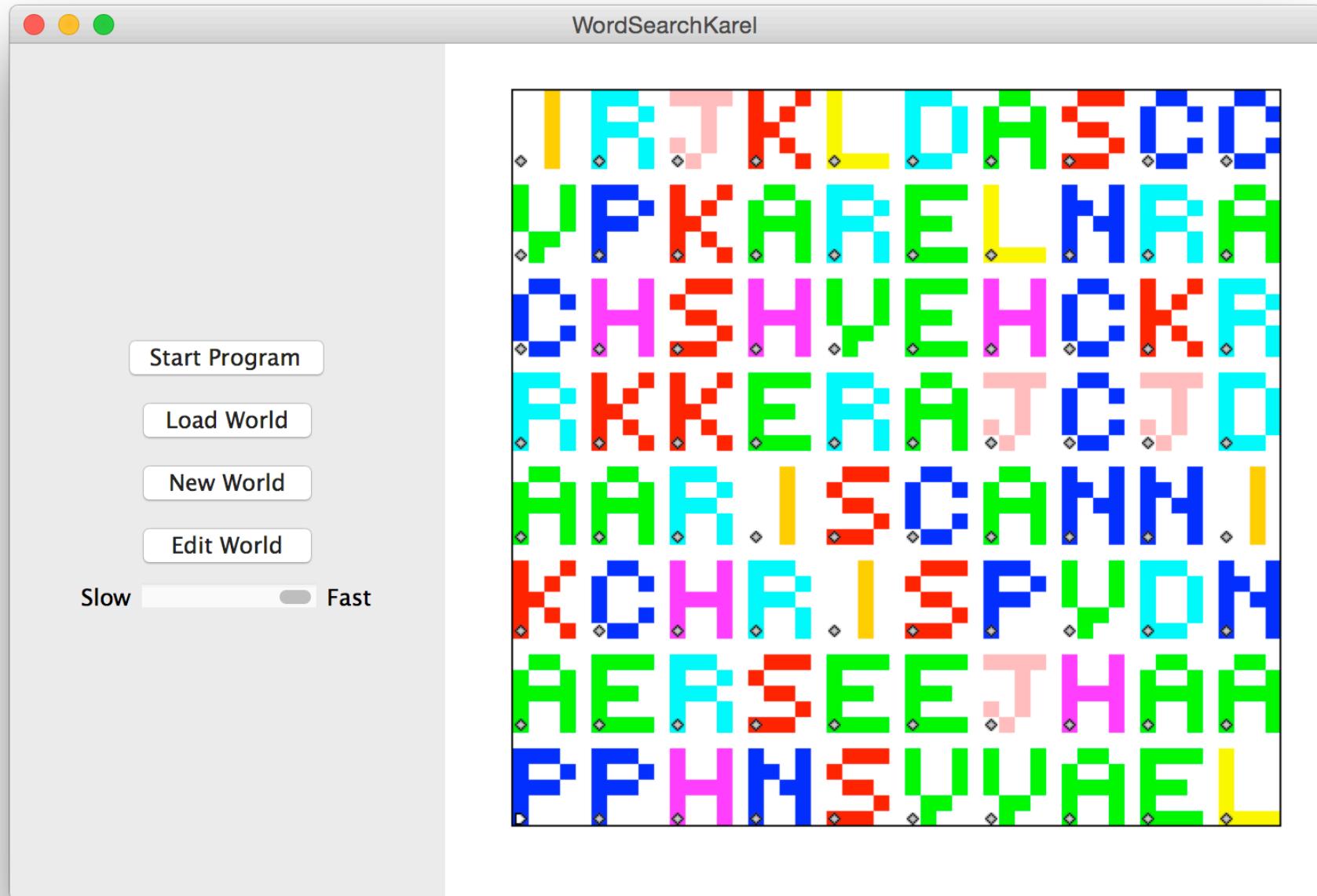


Before



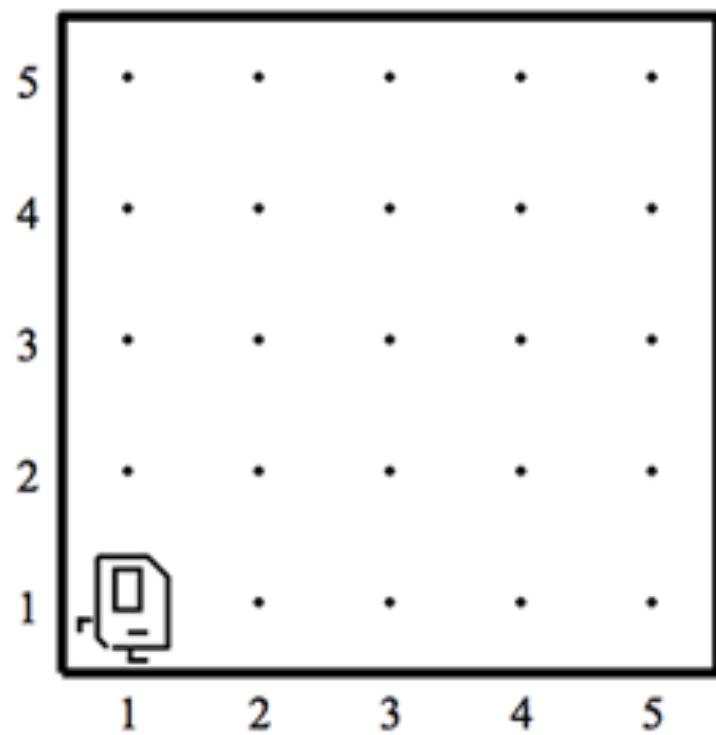
After



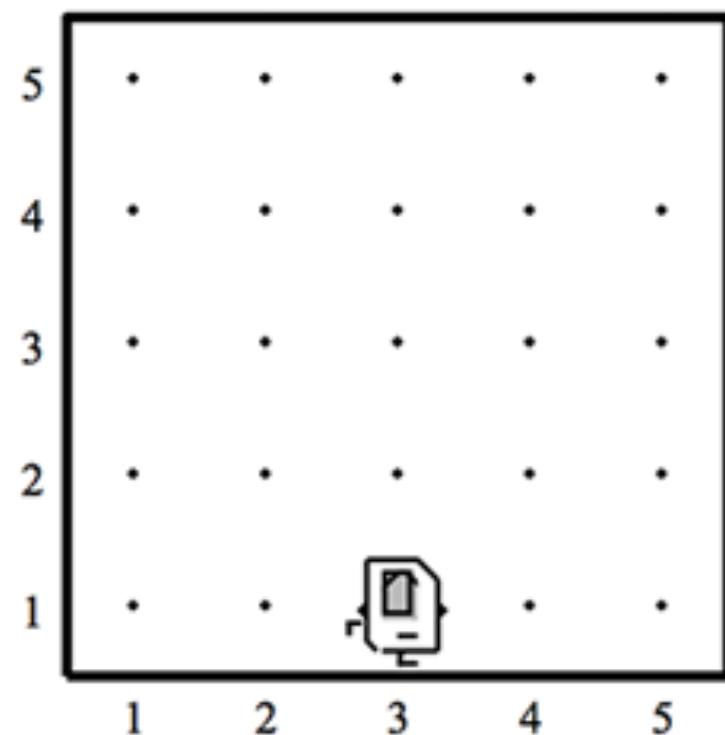


# Midpoint Karel

*Before*



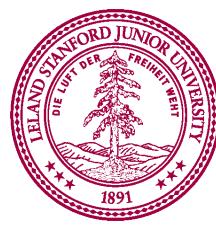
*After*



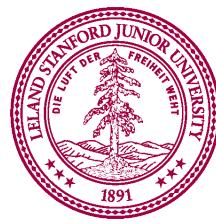
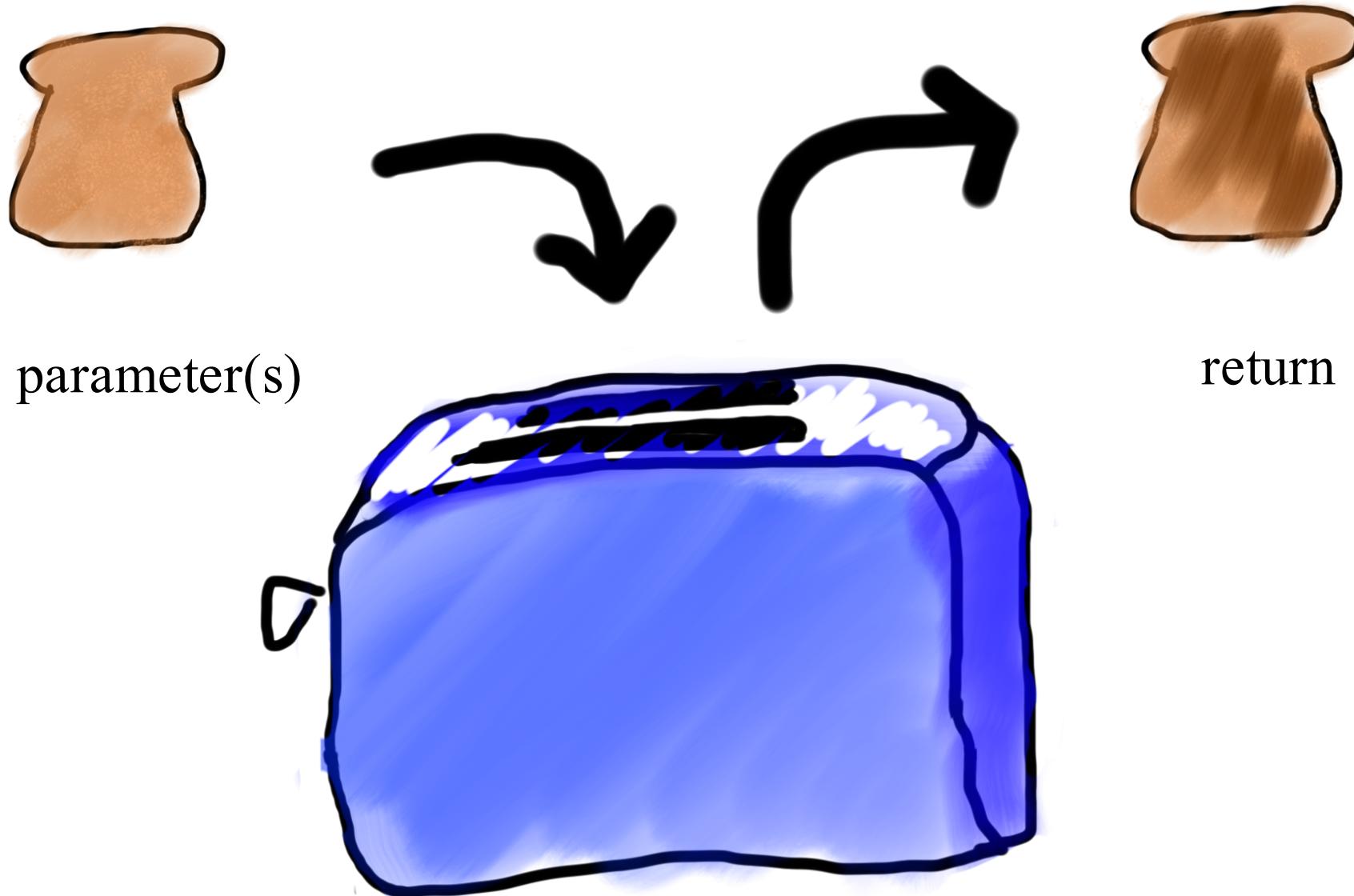
# Variables are Like Boxes



Piech, CS106A, Stanford University



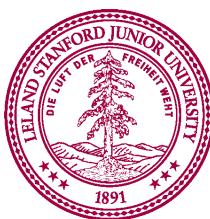
# Methods are Like Toasters



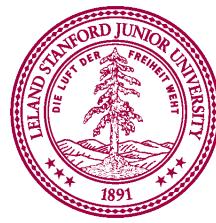
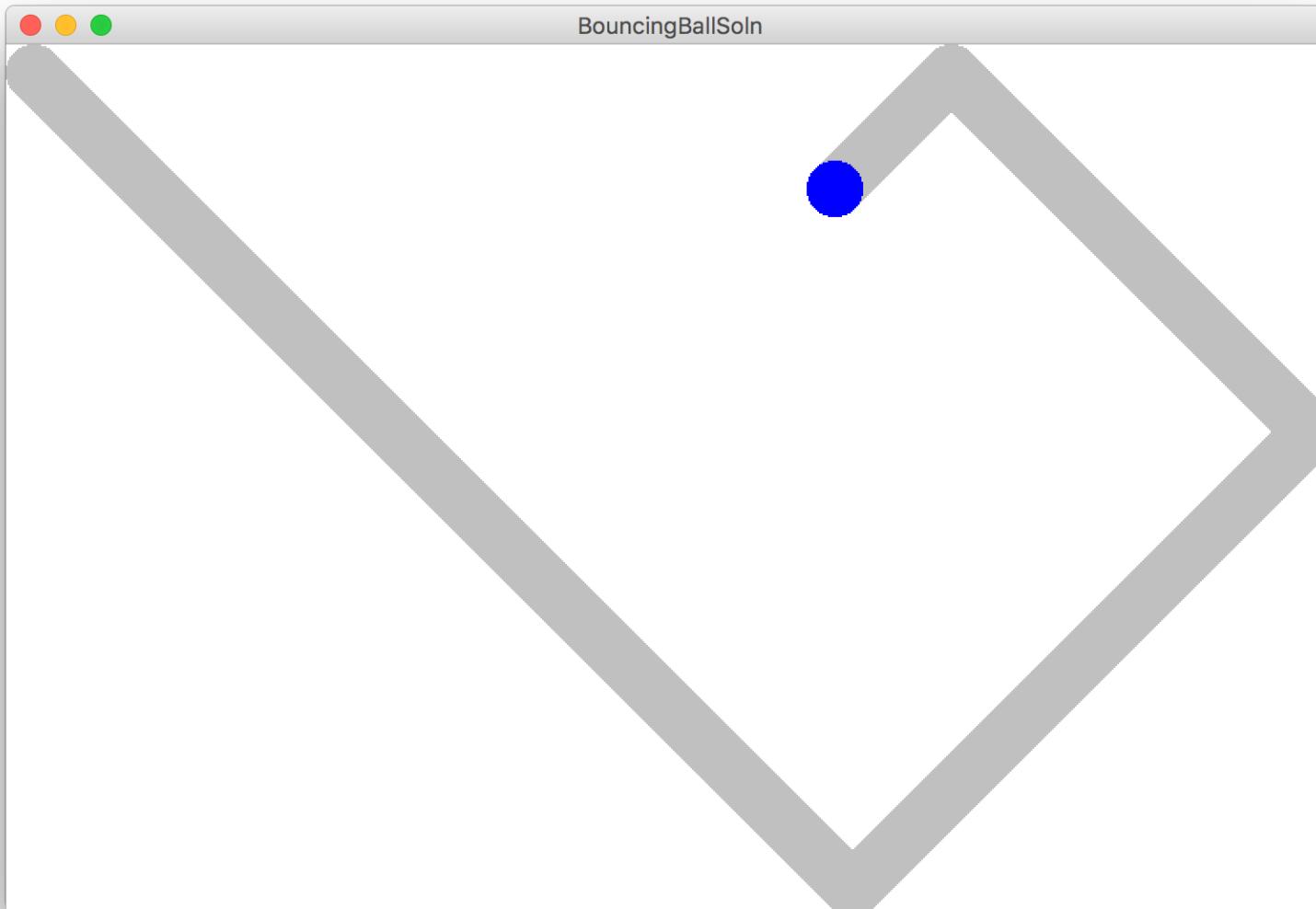
# A Variable love story

## Chapter 2

Piech, CS106A, Stanford University



# You will be able to write Bouncing Ball



# Add Mouse Listener

Run Method



Mouse Moved Method



Mouse Listener



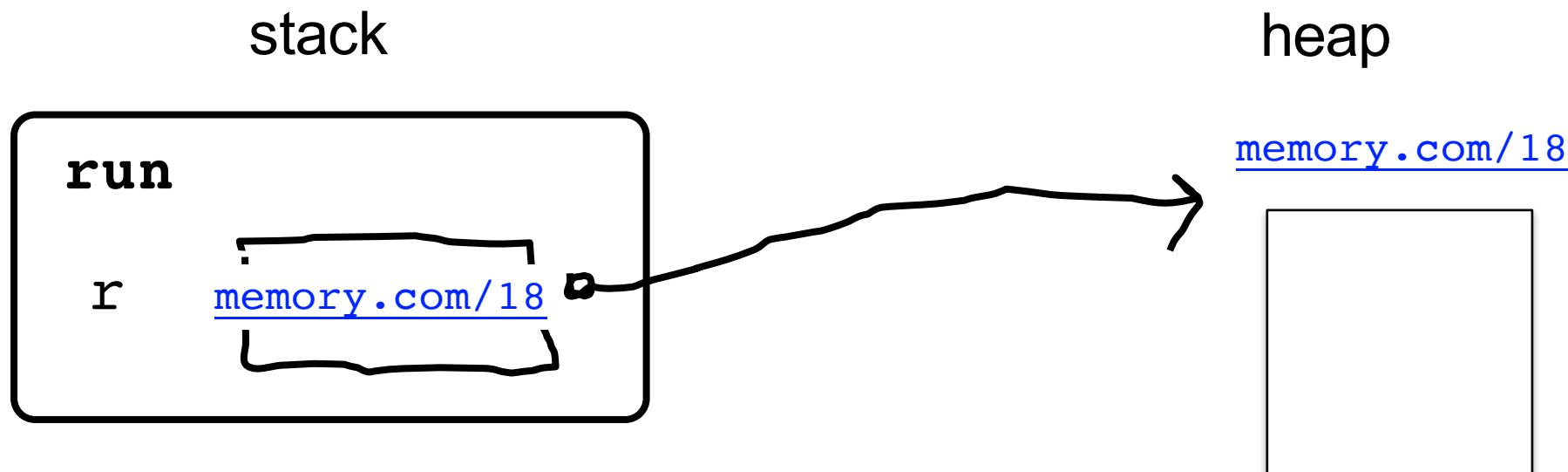
addMouseListeners();

LELAND STANFORD JUNIOR UNIVERSITY

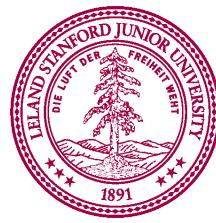
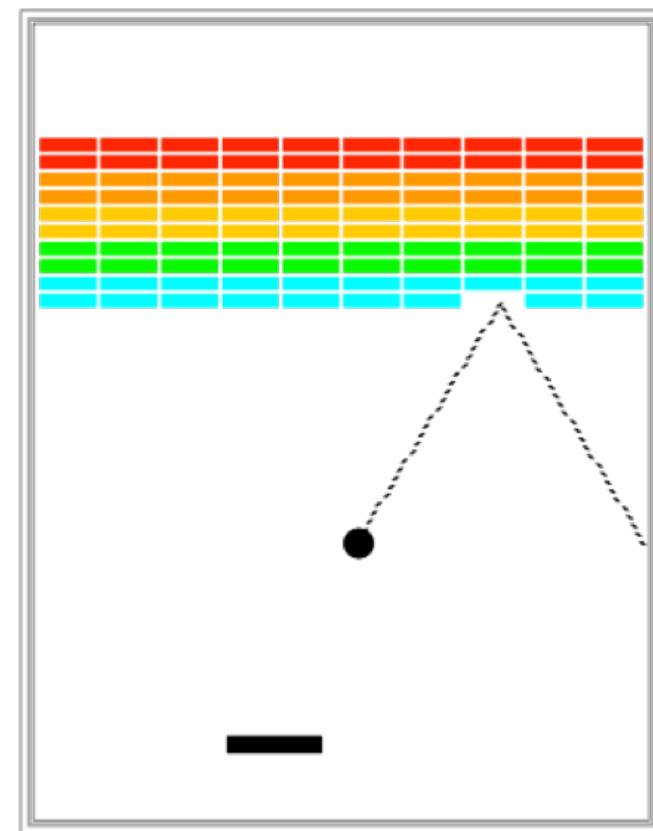
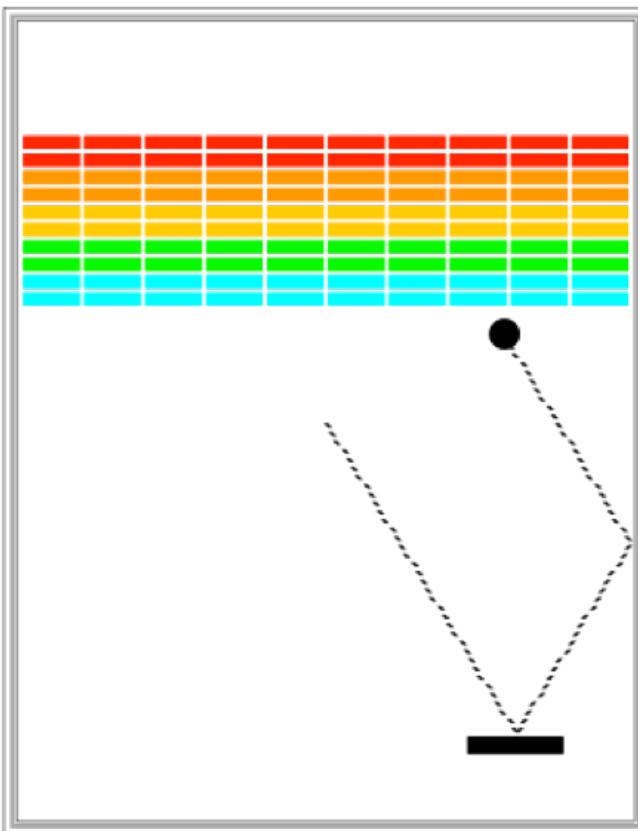
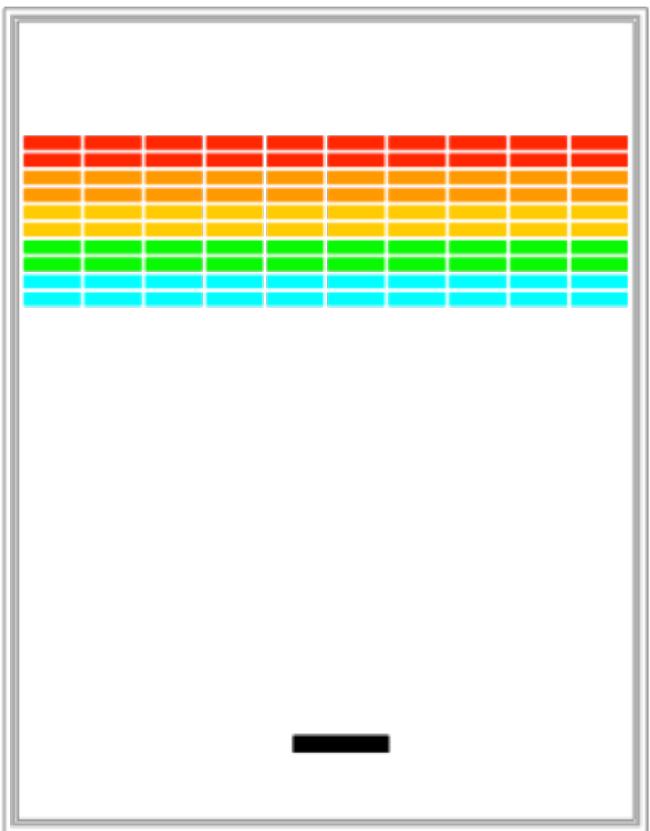


# Objects store memory addresses

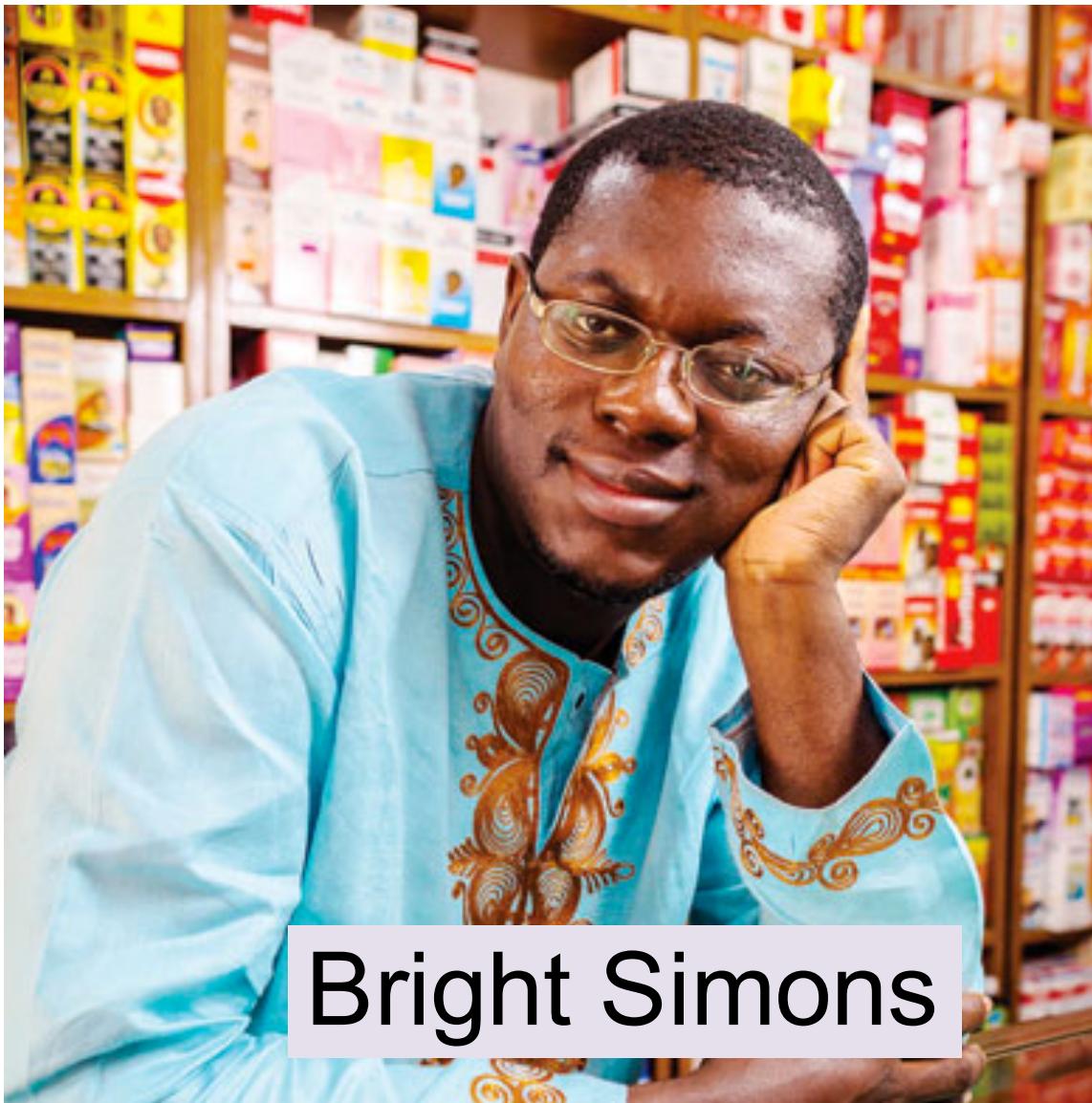
```
public void run() {  
    GRect r = new GRect(50, 50);  
}
```



# Breakout



# Chris' Favorite Program

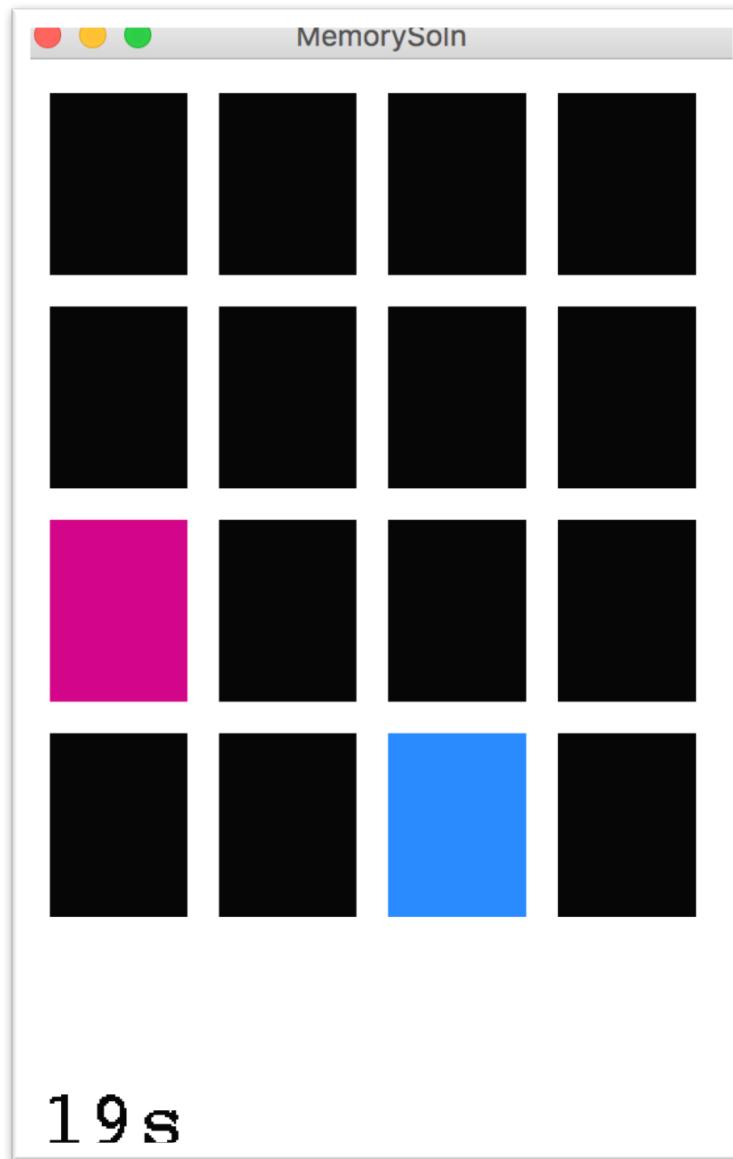


Bright Simons

Piech, CS106A, Stanford University

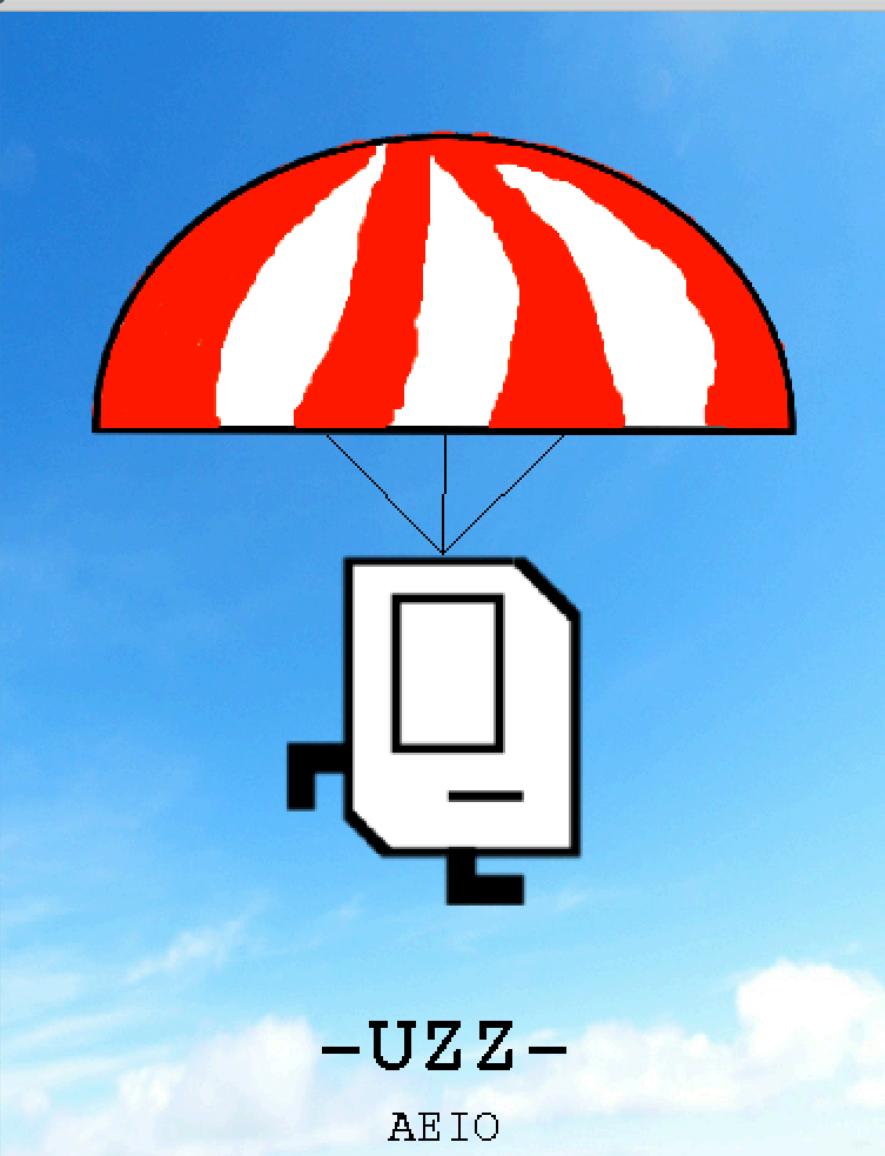


# Today, we build!



# Hangman

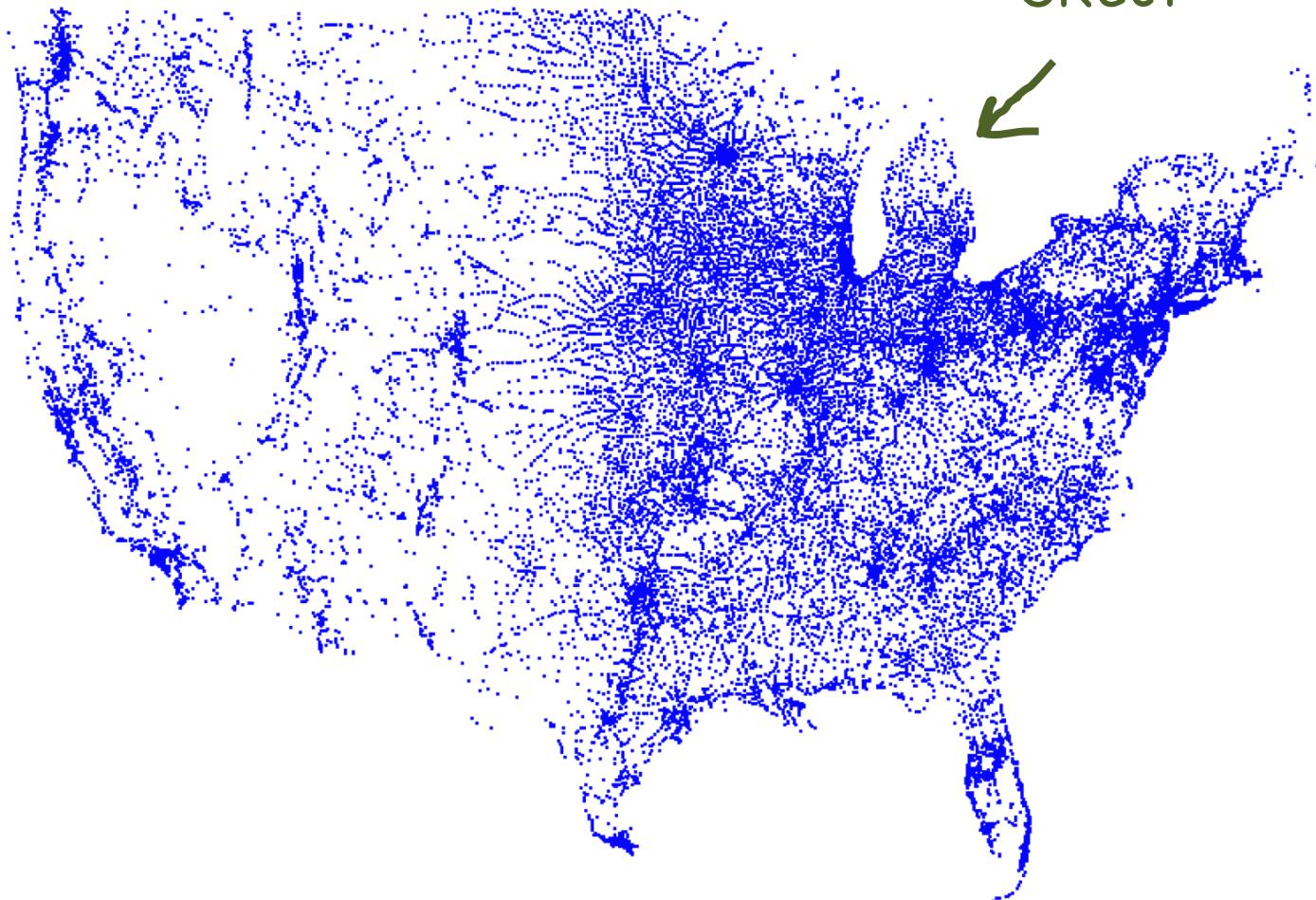
```
Welcome to Hangman
Your word looks like this: -----
You have 7 guesses left
Your guess: a
There are no A's in the word.
Your word looks like this: -----
You have 6 guesses left
Your guess: e
There are no E's in the word.
Your word looks like this: -----
You have 5 guesses left
Your guess: i
There are no I's in the word.
Your word looks like this: -----
You have 4 guesses left
Your guess: o
There are no O's in the word.
Your word looks like this: -----
You have 3 guesses left
Your guess: u
That guess is correct.
Your word looks like this: -U---
You have 3 guesses left
Your guess: z
That guess is correct.
Your word looks like this: -UZZ-
You have 3 guesses left
Your guess:
```



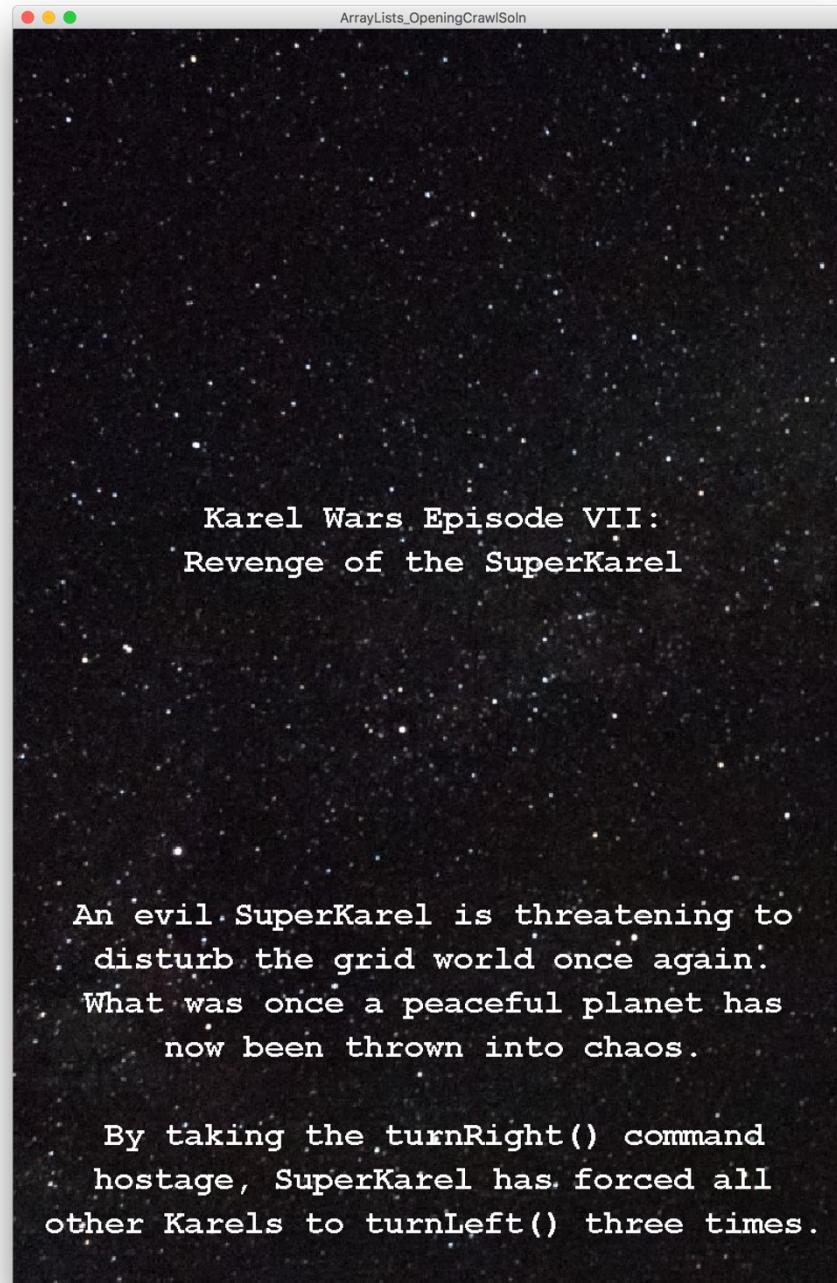
# Files

SeeTheUs

Each blue dot is a tiny  
GRect



# Karel Wars

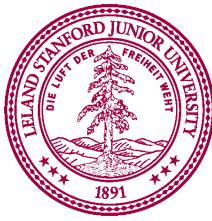


Piech, CS106A, Stanford University



# Eric Roberts

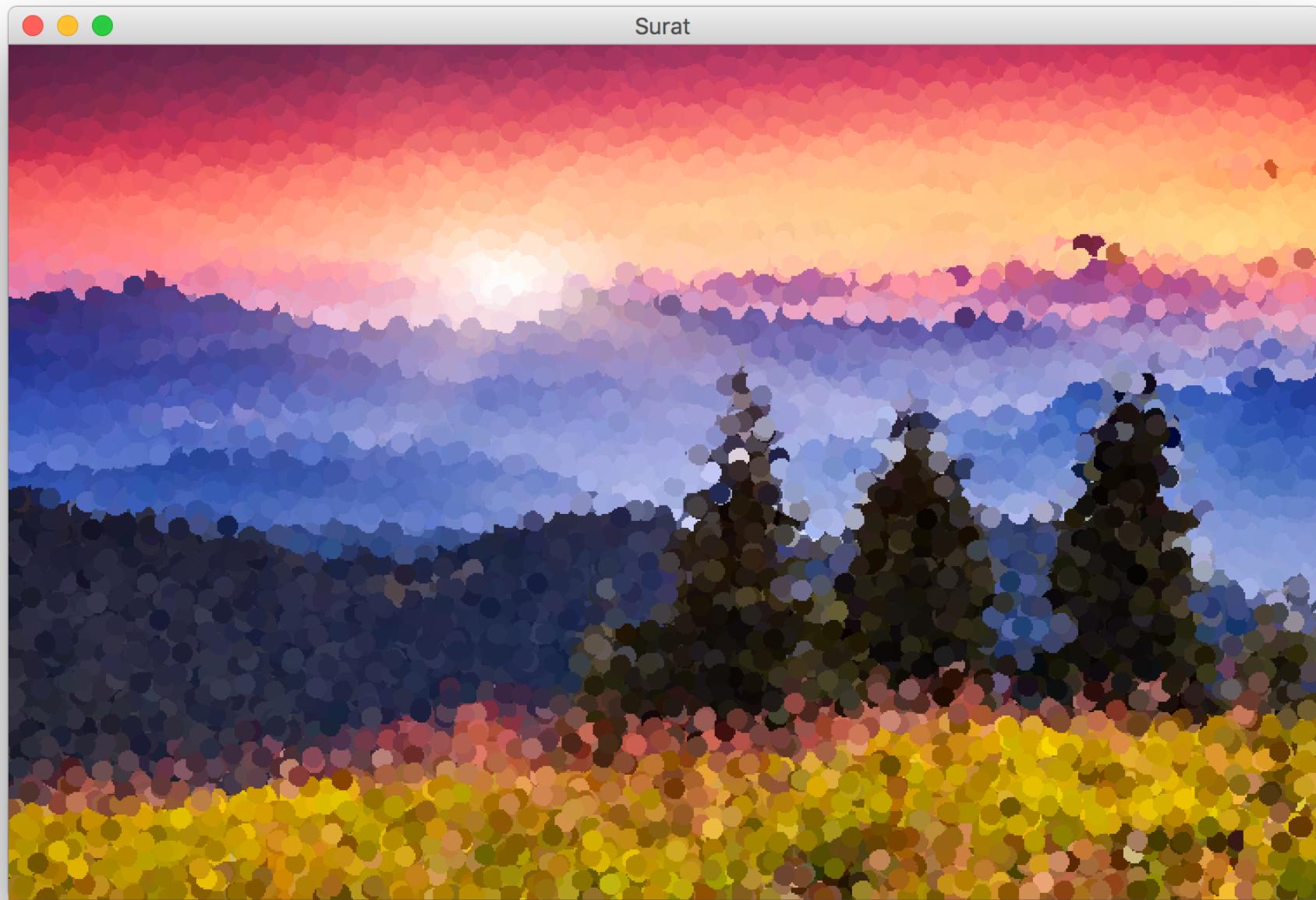
Piech, CS106A, Stanford University



# The Matrix



# Surat



Piech, CS106A, Stanford University



# Yahtzee

Yahtzee

Category	Chris	Nick
Ones	3	
Twos		
Threes		
Fours		
Fives		
Sixes		
Upper Score		
Upper Bonus (35)		
Three of a Kind		
Four of a Kind		
Full House (25)		25
Small Straight (30)	30	
Large Straight (40)	40	
Yahtzee! (50)		50
Chance		
Lower Score		
TOTAL	73	75

Roll Dice

?

?

?

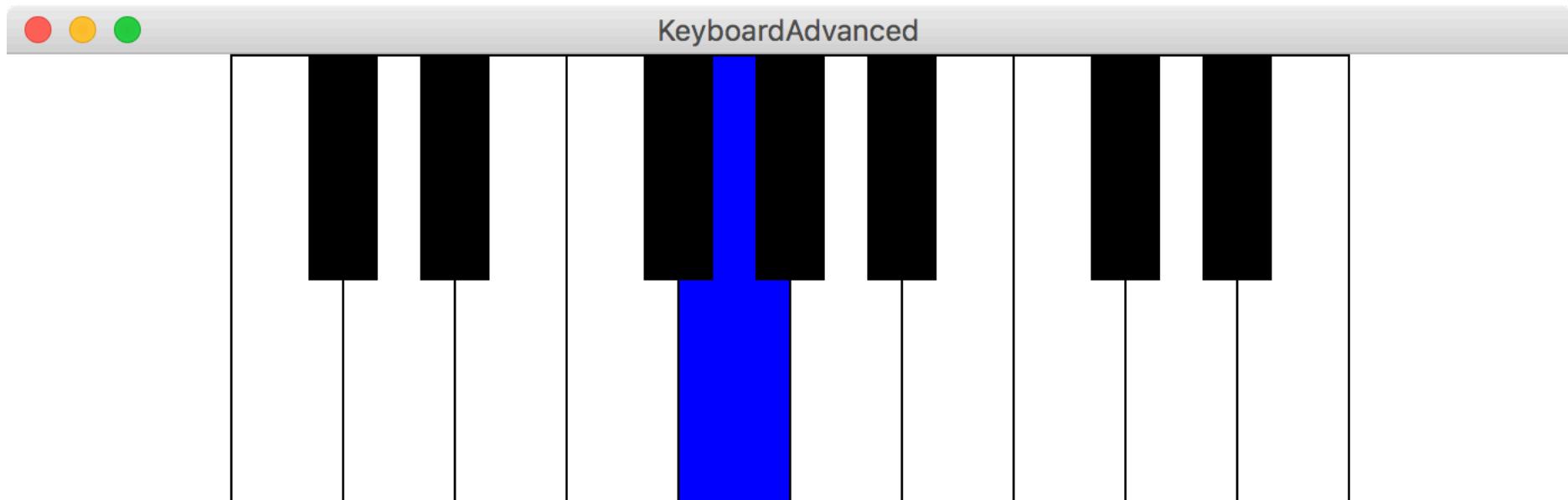
?

?

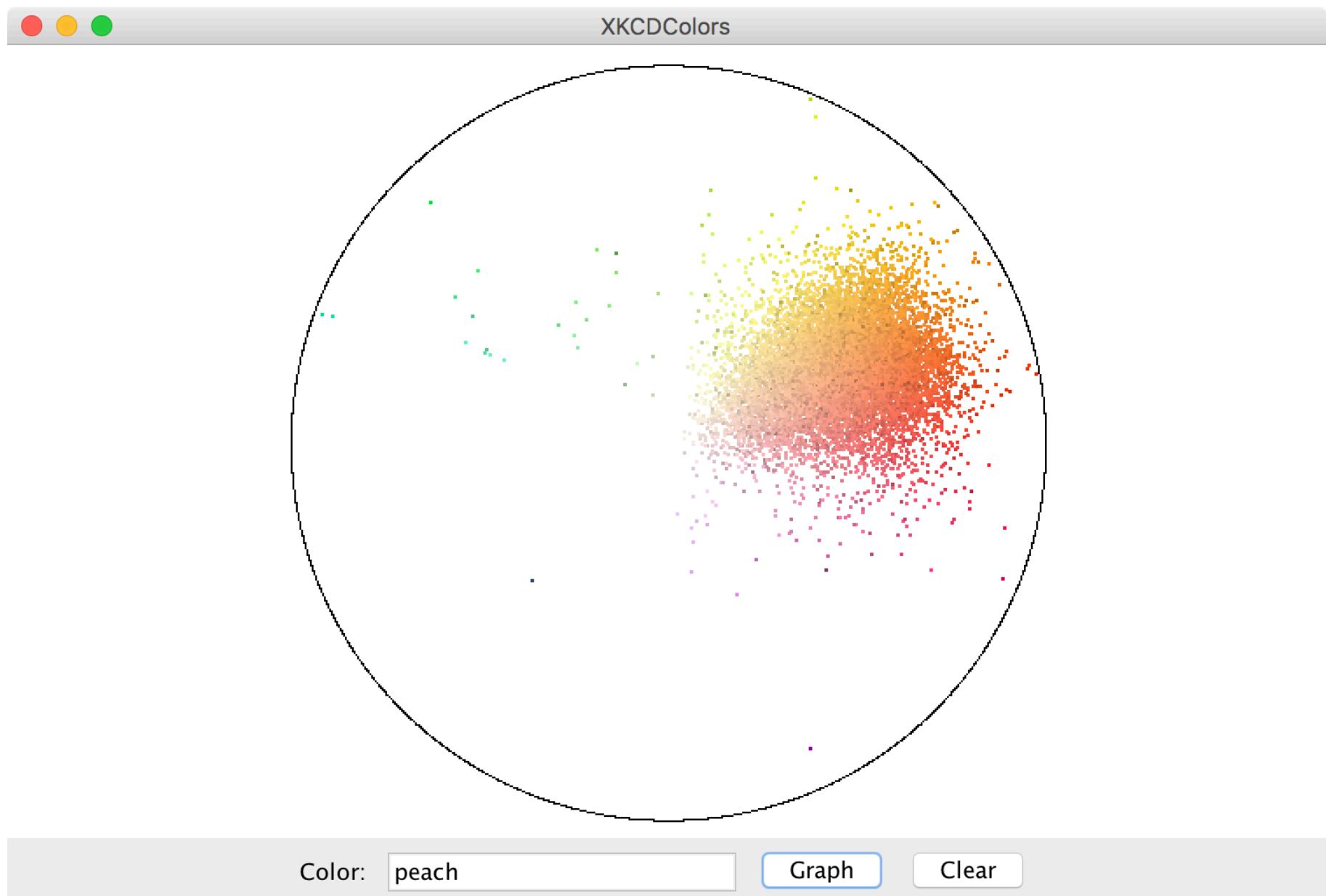
Nick's turn! Click the "Roll Dice" button to roll the dice.



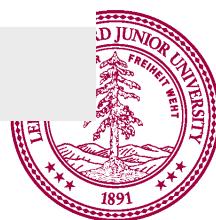
# Make a keyboard



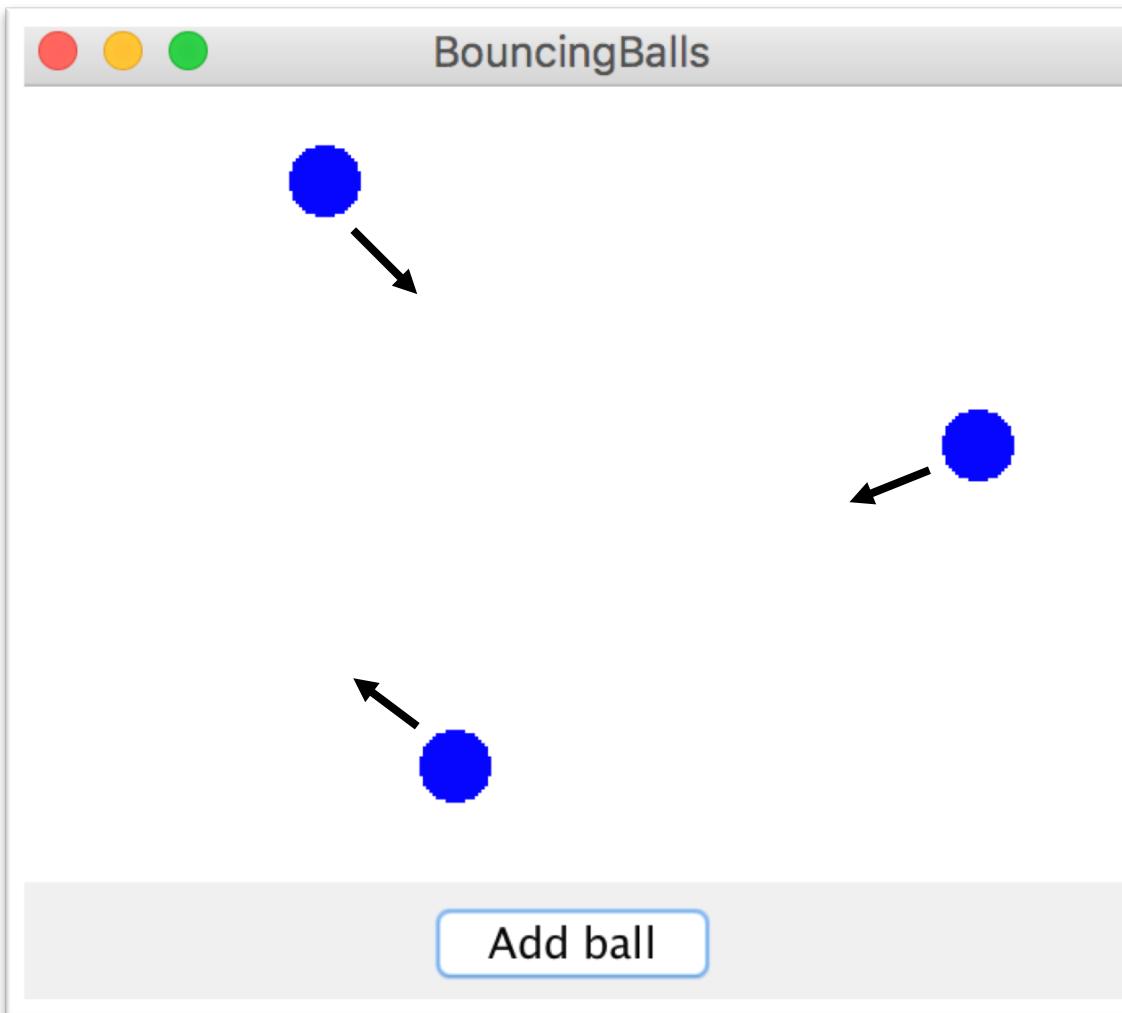
# Color Map



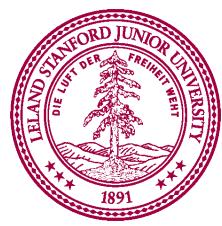
Piech, CS106A, Stanford University

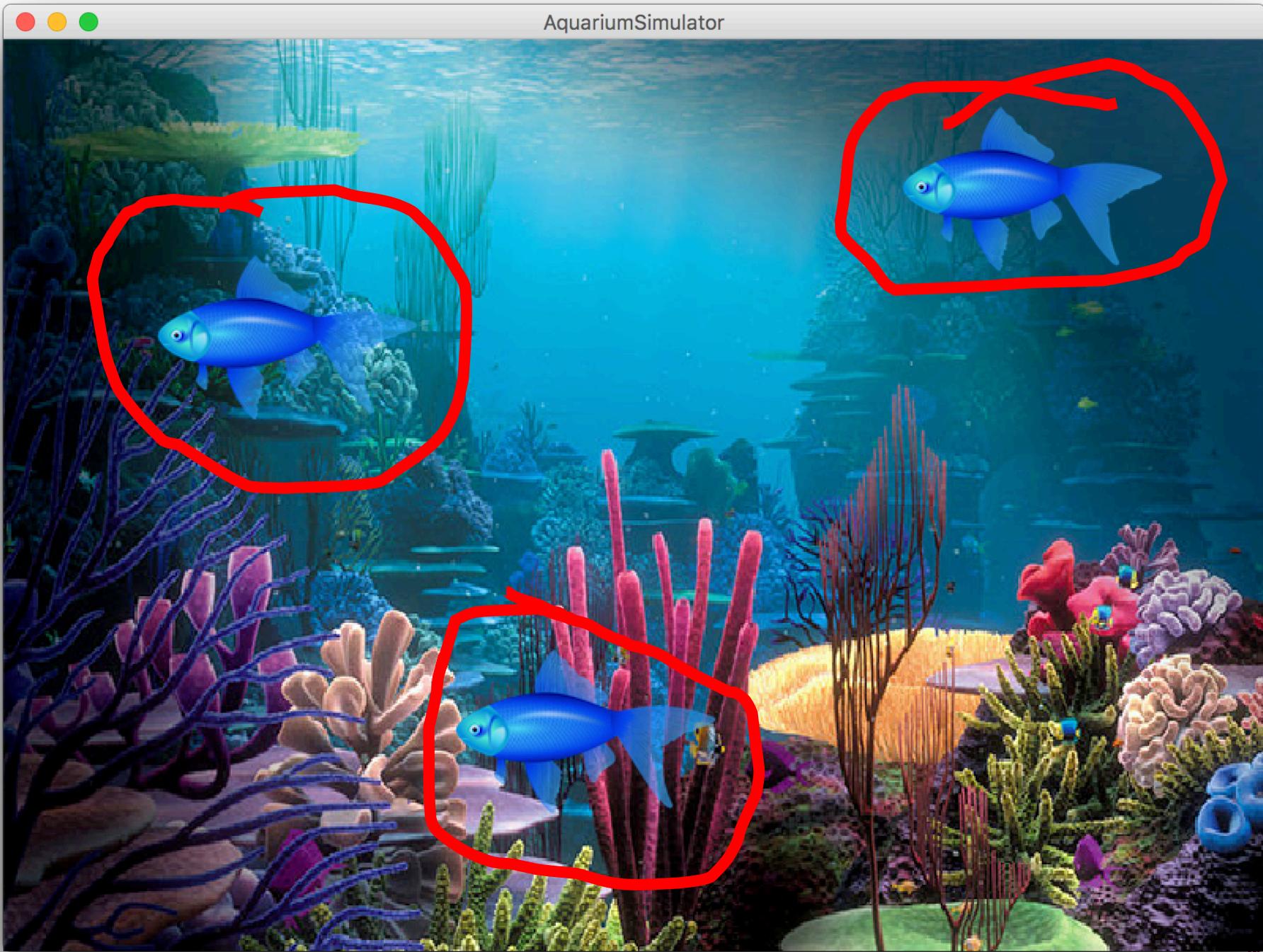


# Bouncing Balls



Piech, CS106A, Stanford University

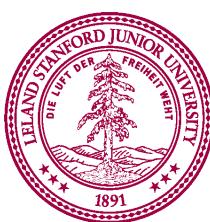
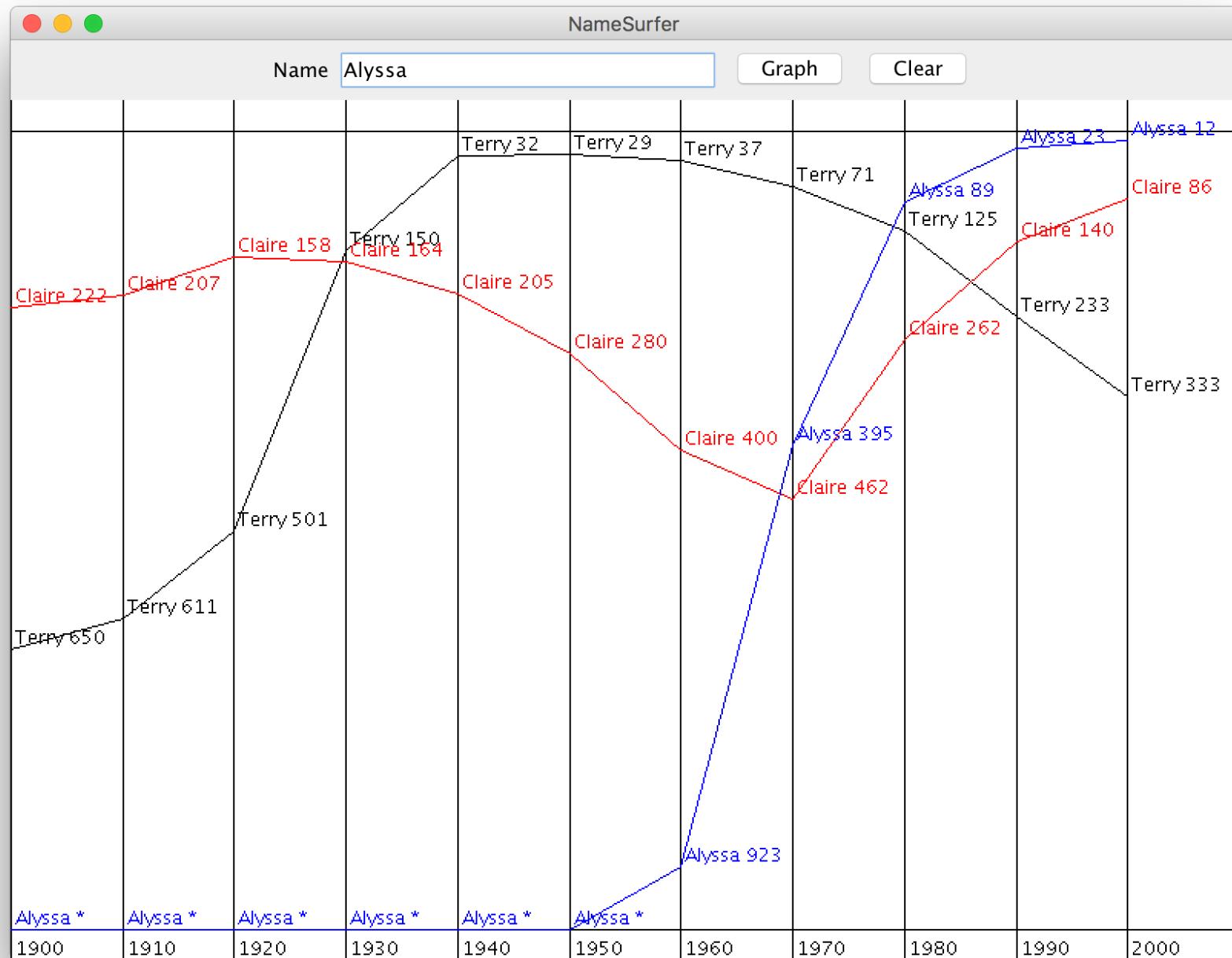




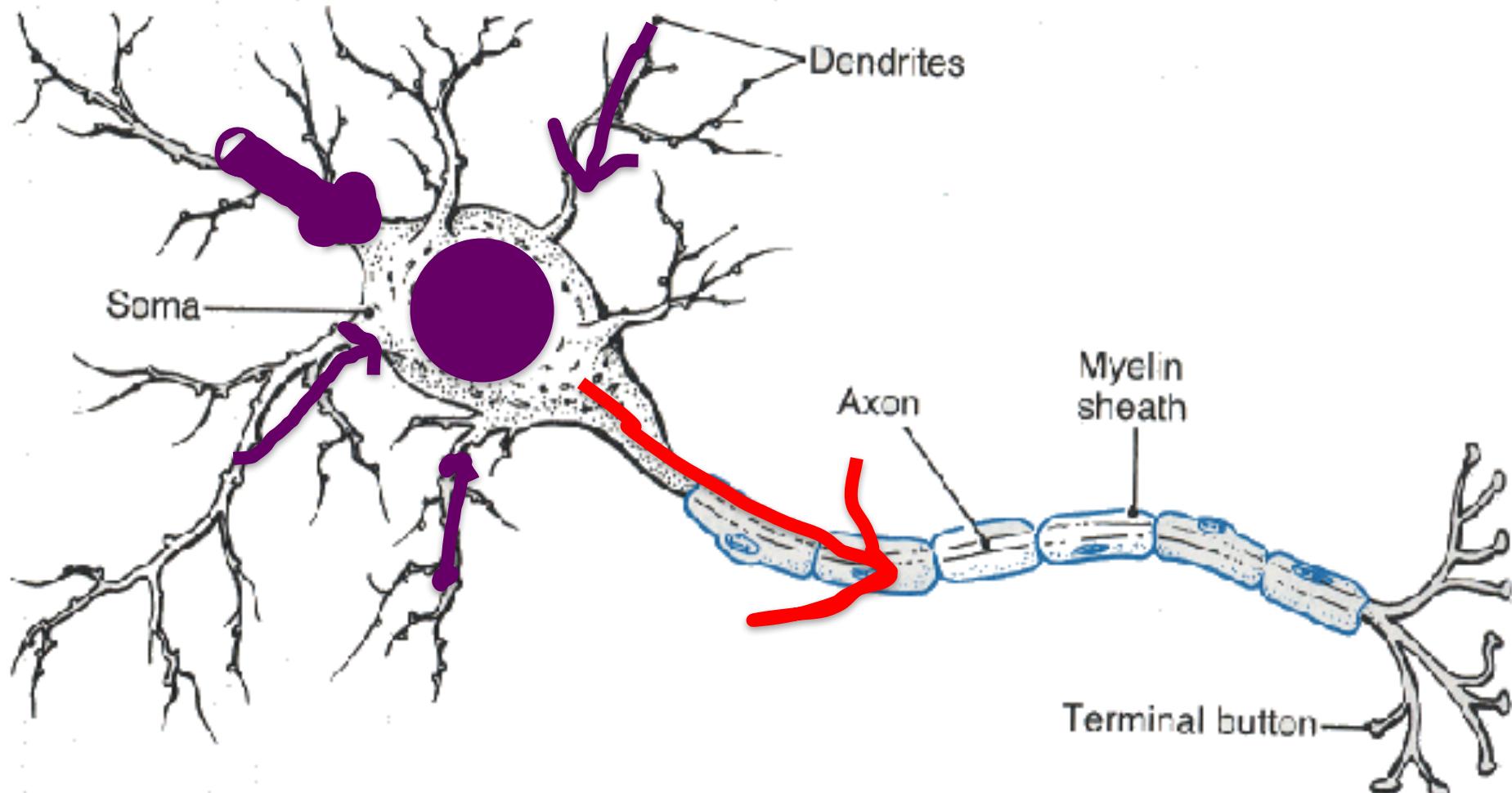
Piech, CS106A, Stanford University



# NameSurfer



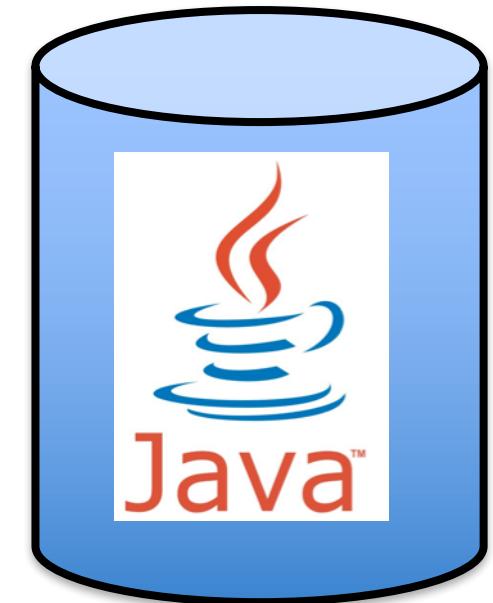
# Neural Networks



# Server / Client

Face Book Server

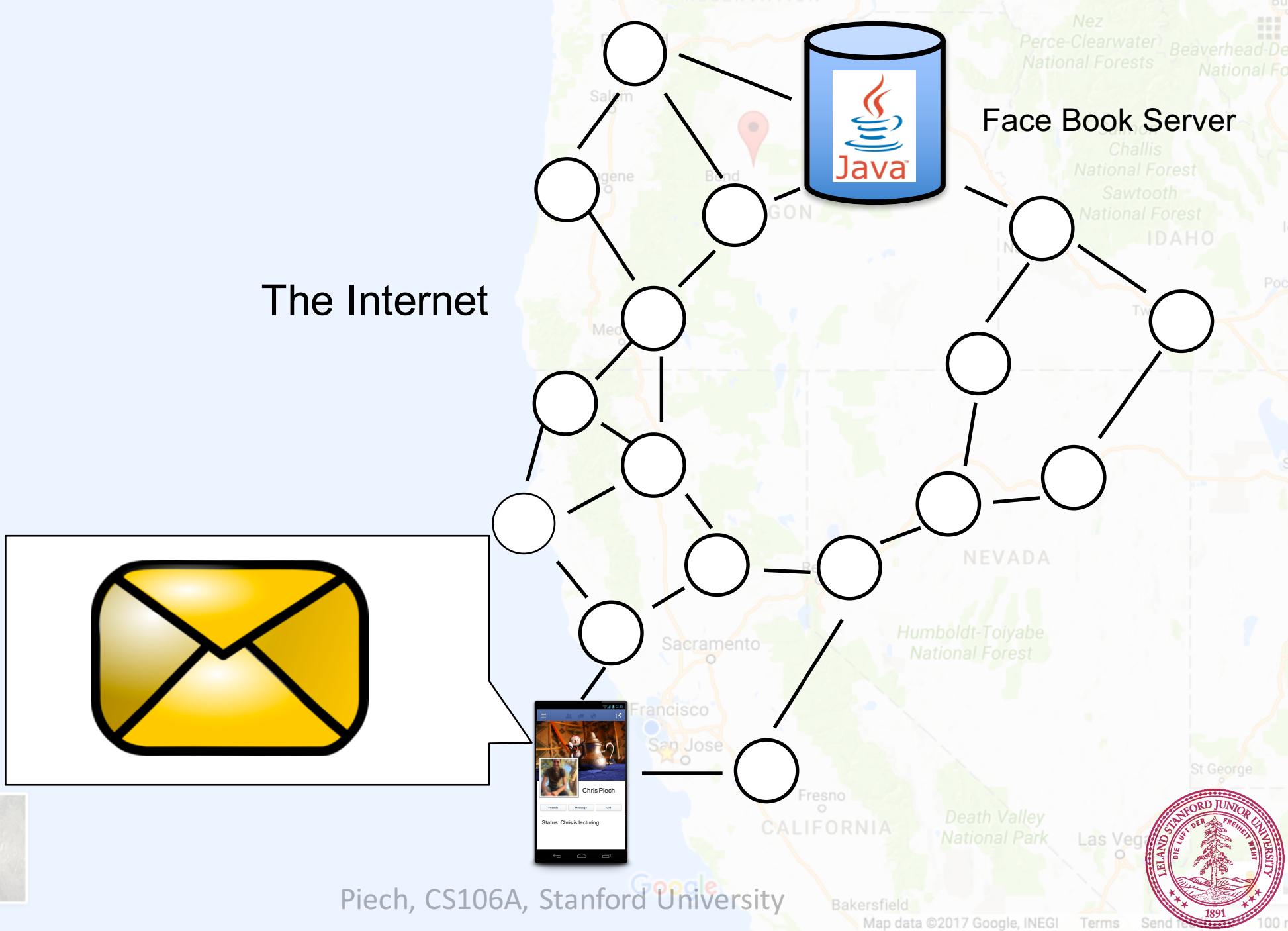
Send the **status** for  
piech@cs.stanford.edu



“Teaching”



# How the internet works

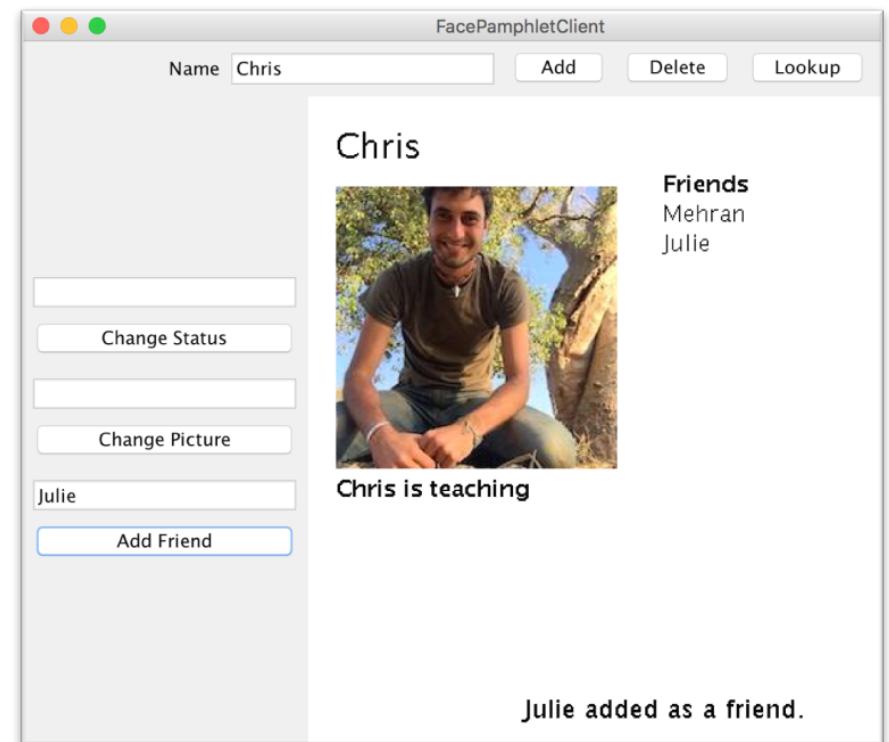


# FacePamphlet

## FacePamphletServer

```
FacePamphletServer
Starting server on port 8000...
addProfile (name=Chris)
=> success
addProfile (name=Mehran)
=> success
addProfile (name=Julie)
=> success
addProfile (name=Julie)
=> Error: Database already contains Julie.
addProfile (name=Barbra Streisand)
=> success
containsProfile (name=Chris)
=> true
containsProfile (name=Barbra Streisand)
=> true
containsProfile (name=Voldemort)
=> false
deleteProfile (name=Voldemort)
=> Error: No profile with name Voldemort.
addProfile (name=Beyonce Knowles)
=> success
deleteProfile (name=Beyonce Knowles)
=> success
containsProfile (name=Beyonce Knowles)
=> false
getStatus (name=Chris)
=>
setStatus (name=Chris, status=testing)
=> success
getStatus (name=Chris)
=> testing
getImgFileName (name=Chris)
=>
setImgFileName (fileName=ChrisP.jpg, name=Chris)
=> success
getImgFileName (name=Chris)
=> ChrisP.jpg
```

## FacePamphletClient



Communicate  
via the internet



# CS106B

## Java in the Wild

## Other Languages

Piech, CS106A, Stanford University



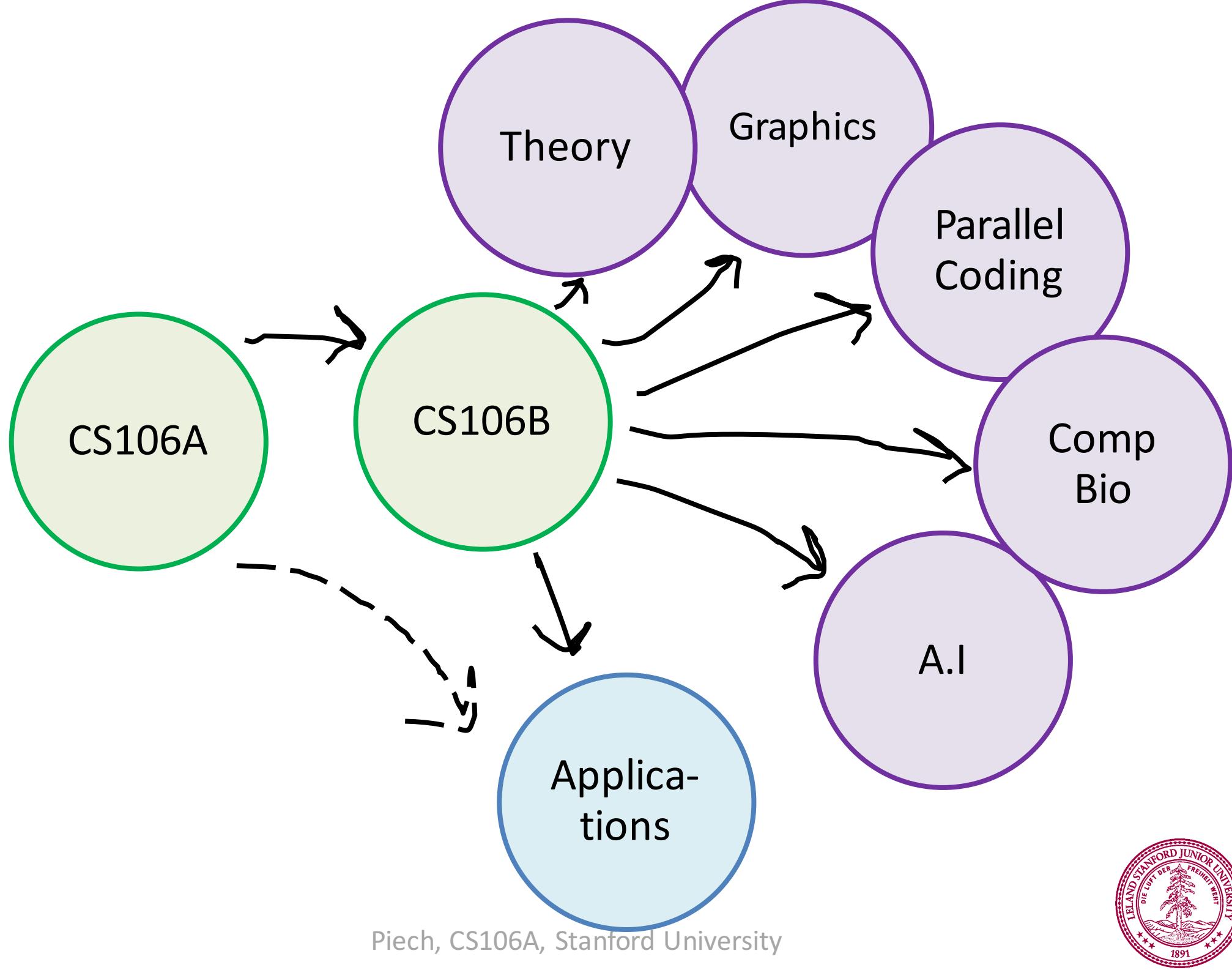
# CS106B

## Java in the Wild

## Other Languages

Piech, CS106A, Stanford University





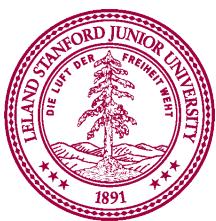
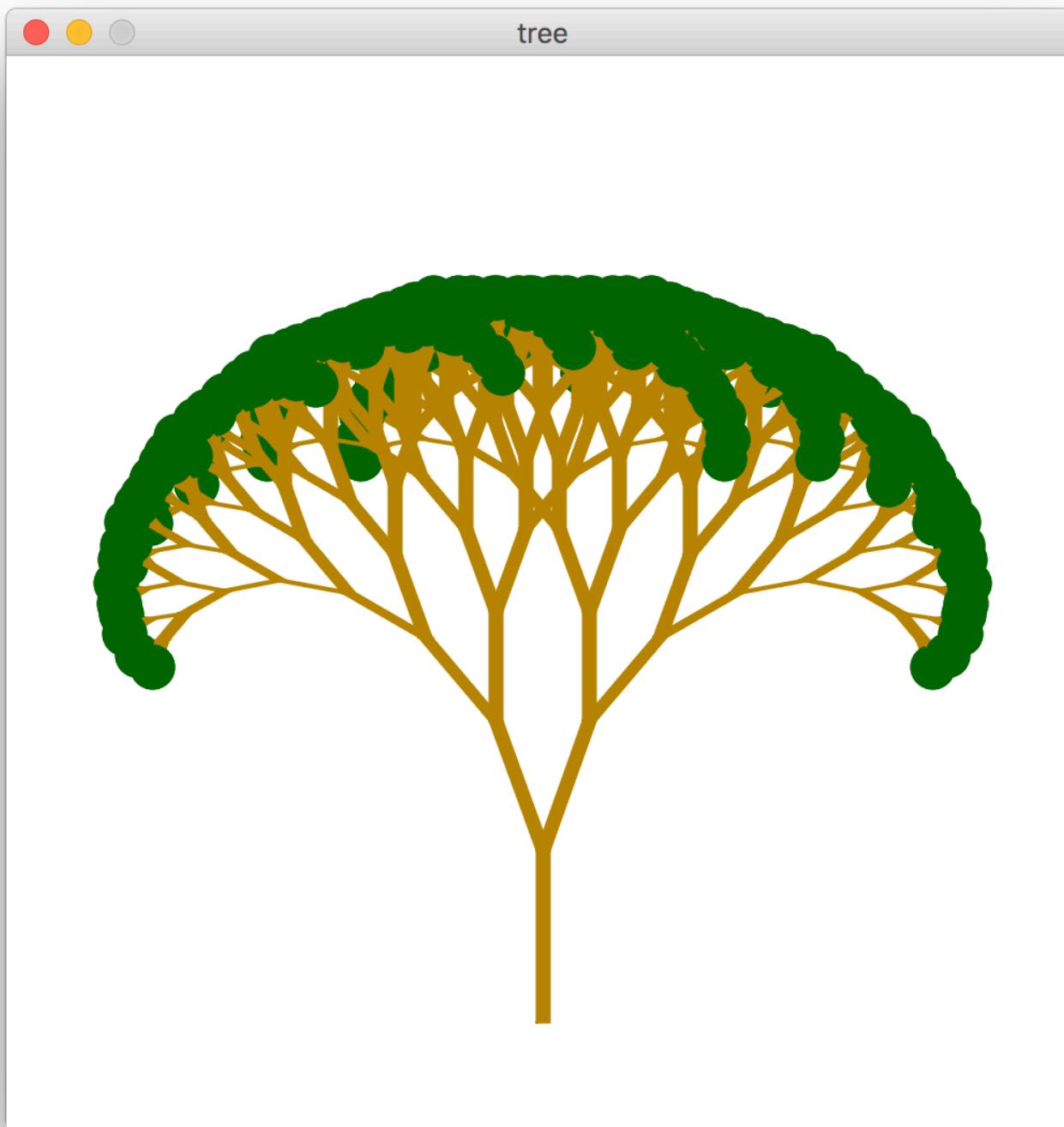
CS106A: Learn the fundamental  
principles in how to program

CS106B: Learn core ideas in how to  
model and solve **complex problems**  
with computers

*Any sufficiently advanced technology  
is indistinguishable from magic*

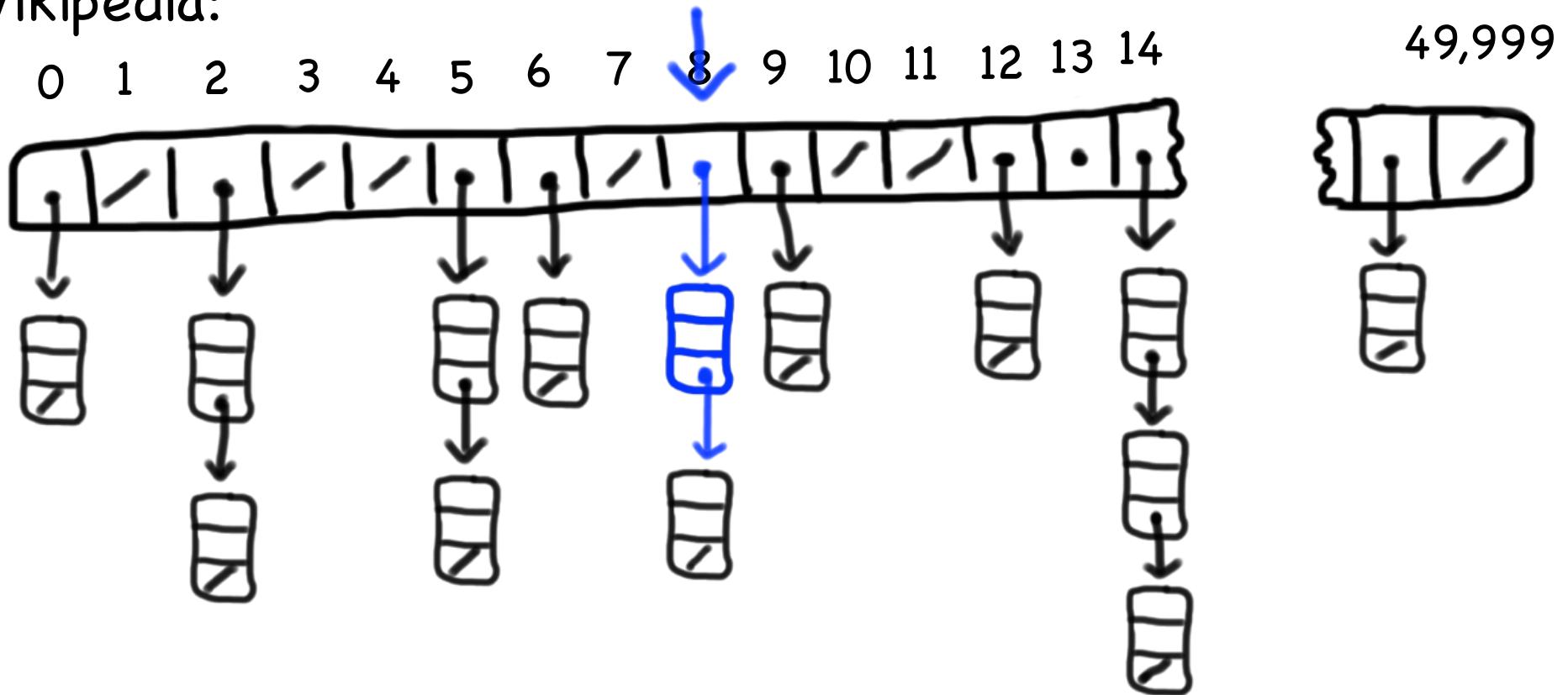
- Arthur Clark

# New Way of Thinking

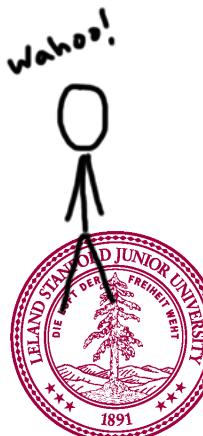


# How does a Hash Map really work?

Wikipedia:



"John Coltrane" → **Hash Fn** → 8



# Same idea is used for internet security

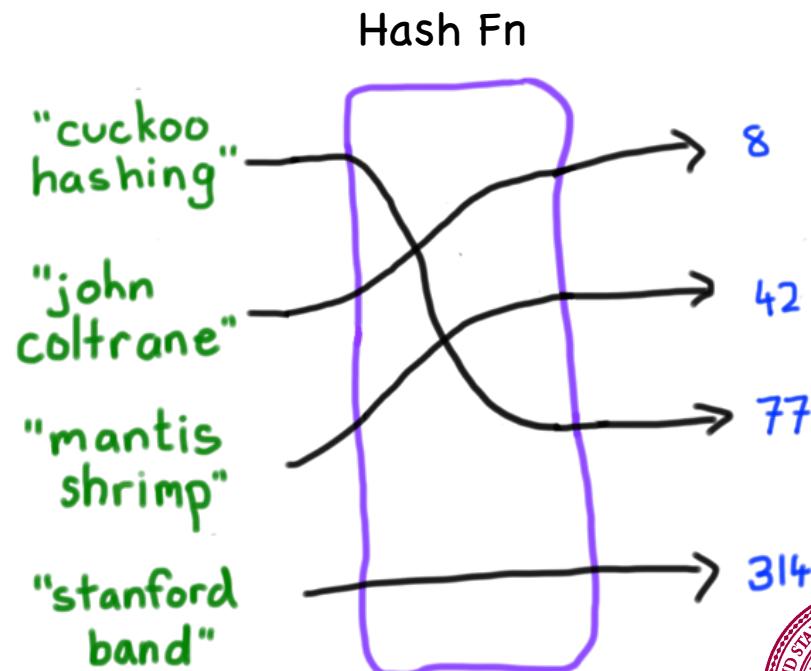
```
int hash(string key);
```



1. Consistent



2. Well Distributed



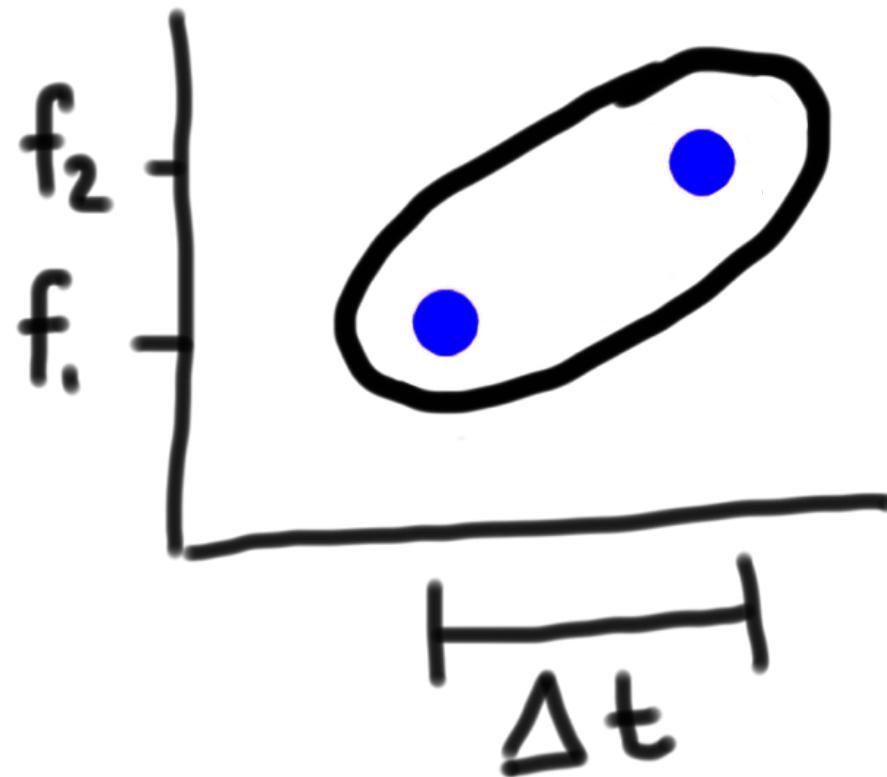
# Hashzam



Piech, CS106A, Stanford University **Source: Shazam**



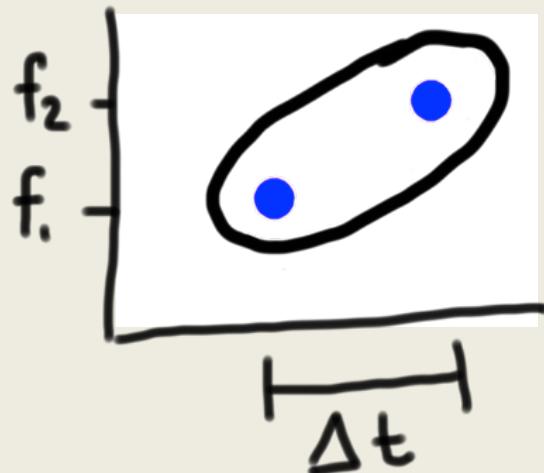
# Note Pairs



# Note/Song Mapping

Shazam

Key:



Value:

You Can Call Me Al – Paul Simon. 7s,  
You Can Call Me Al – Paul Simon. 43s,  
All Right Now – Police. 18s

PhoneBook

Key:

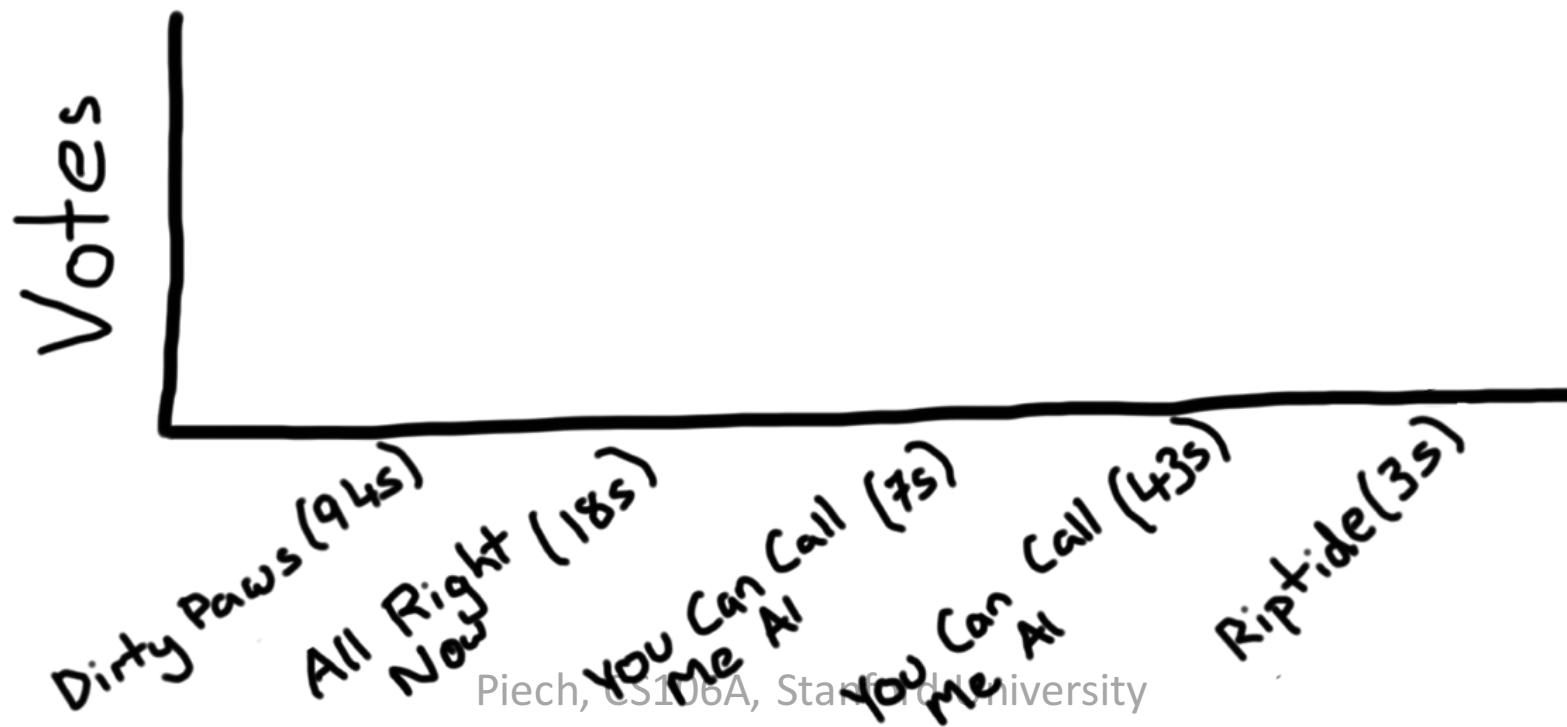
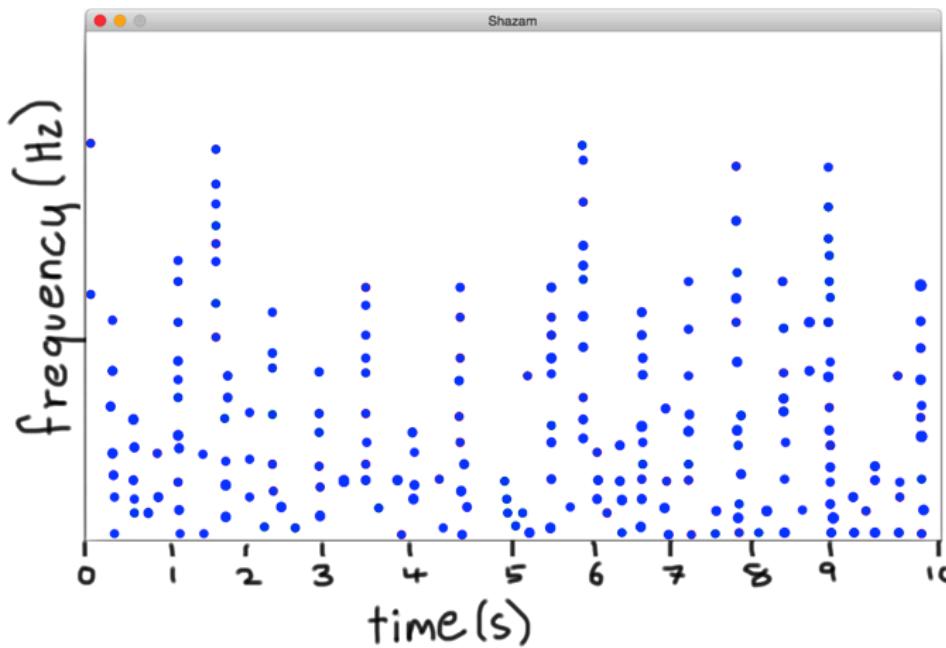
“Jenny”

Value:

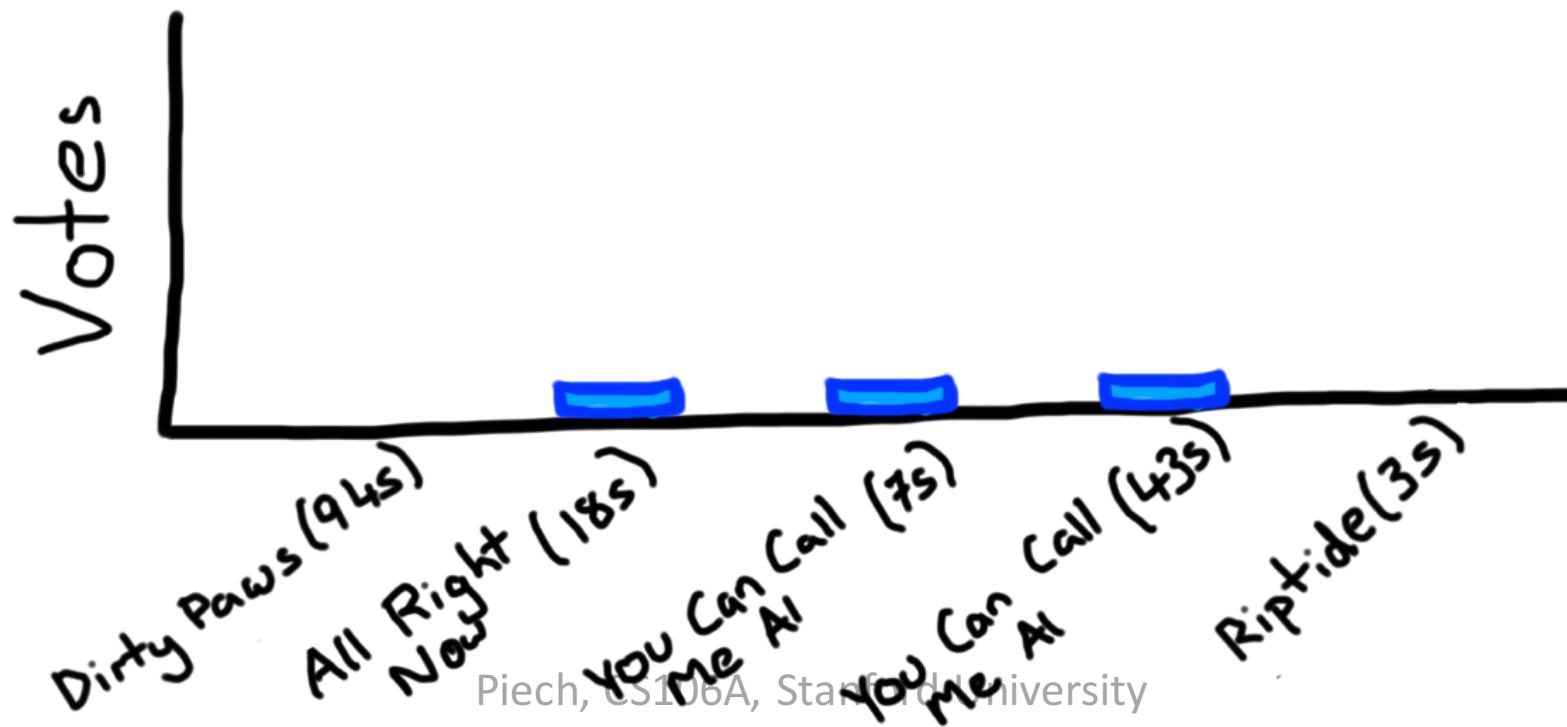
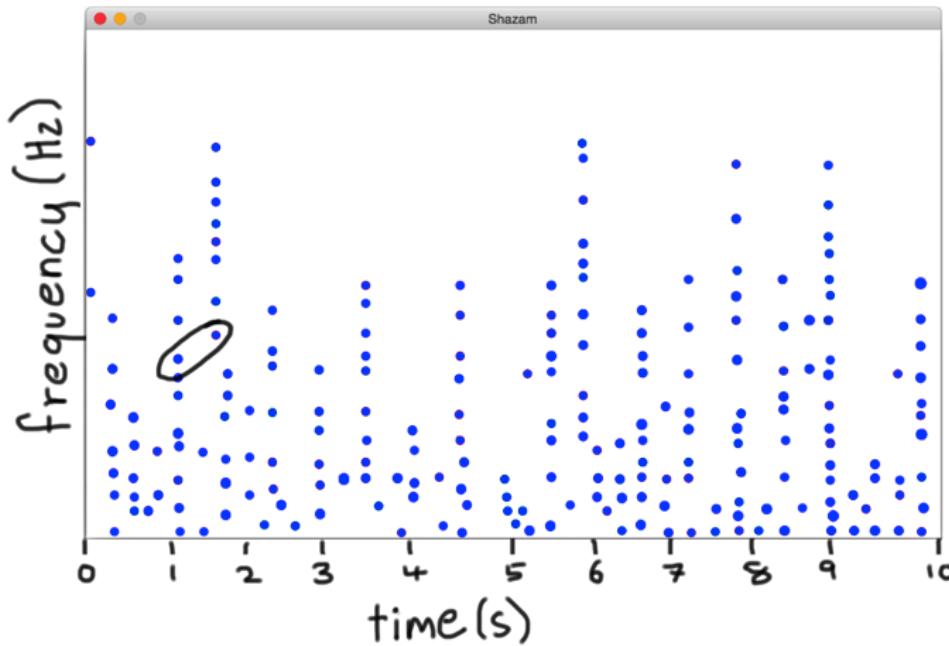
867-5309



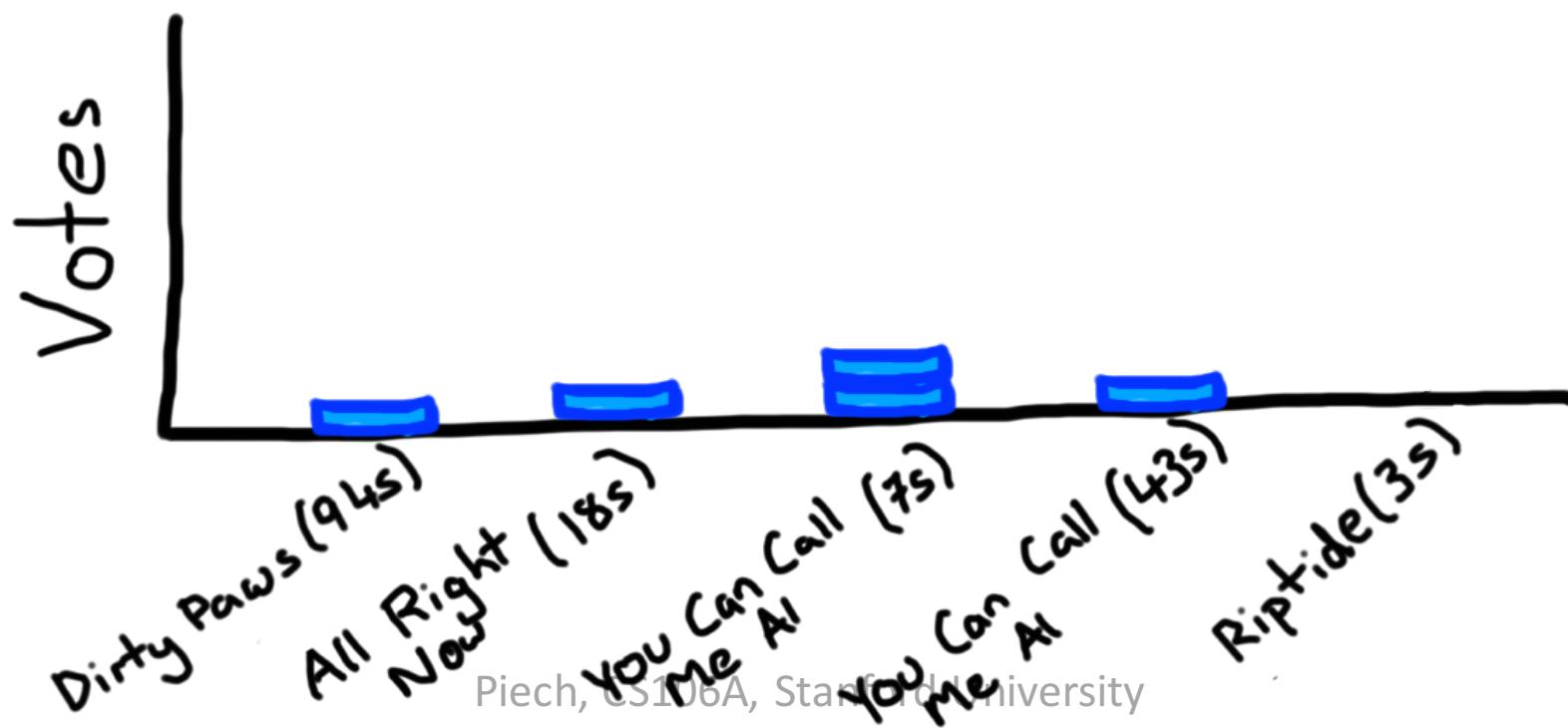
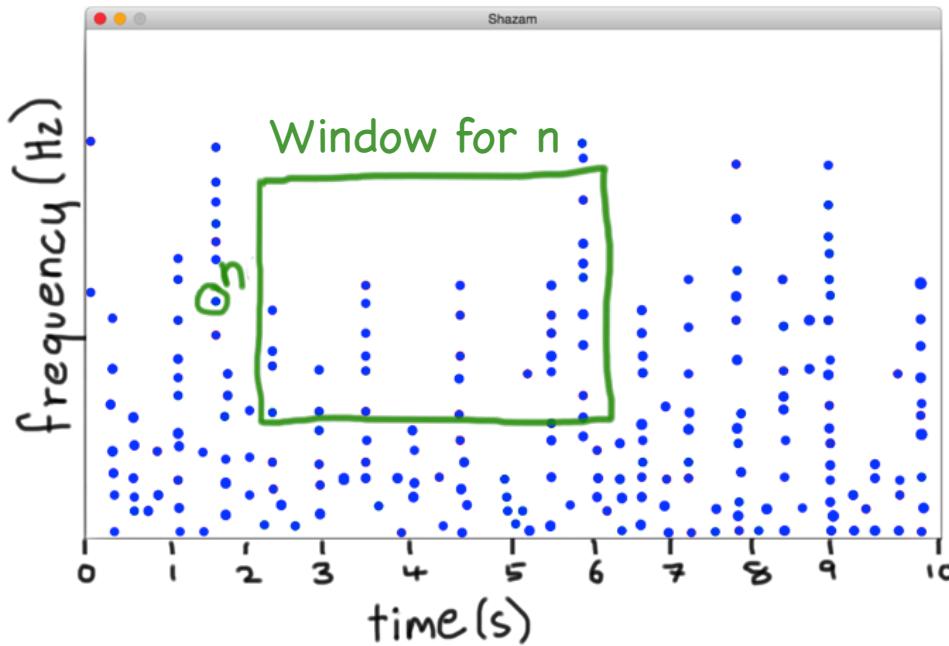
# Note Pair Hashing



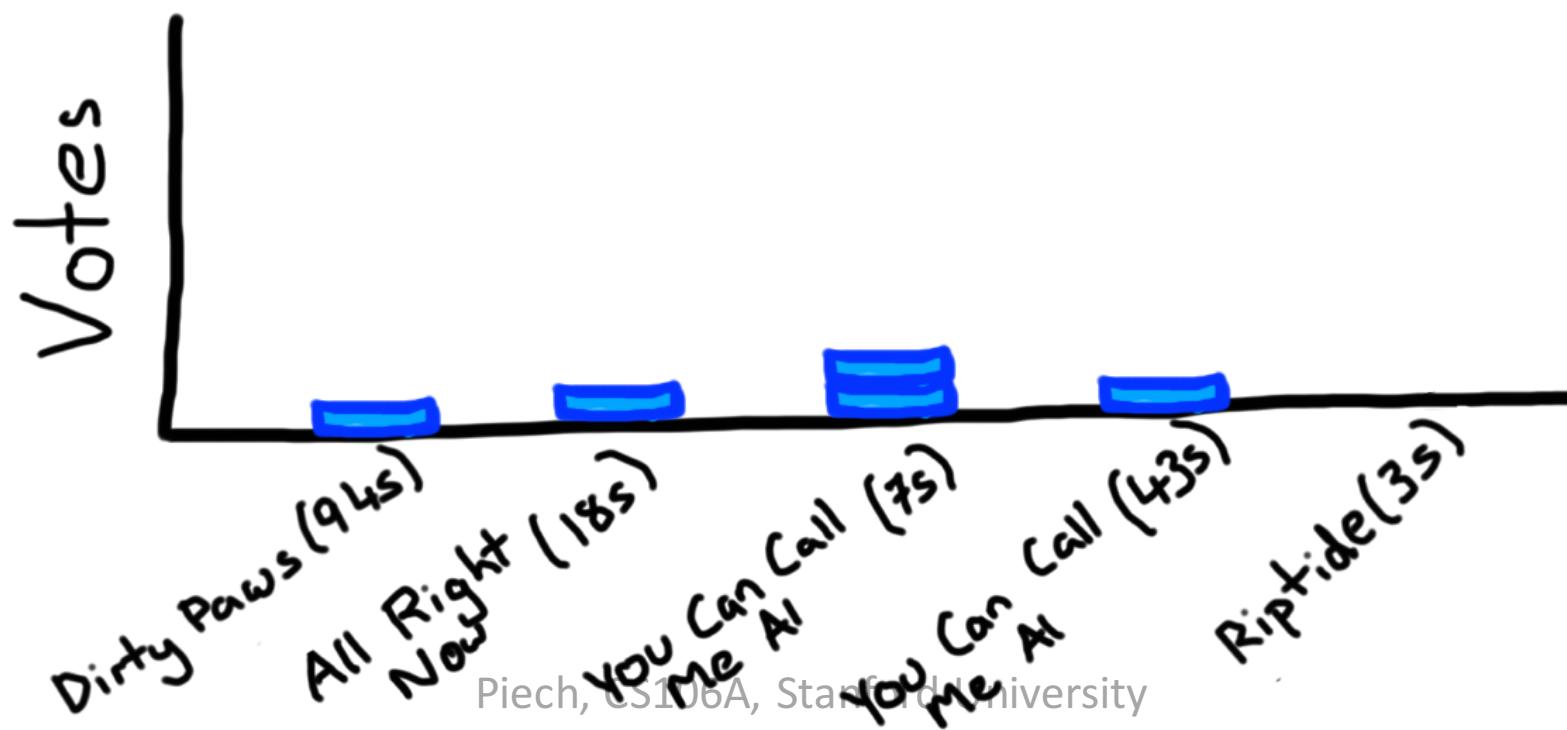
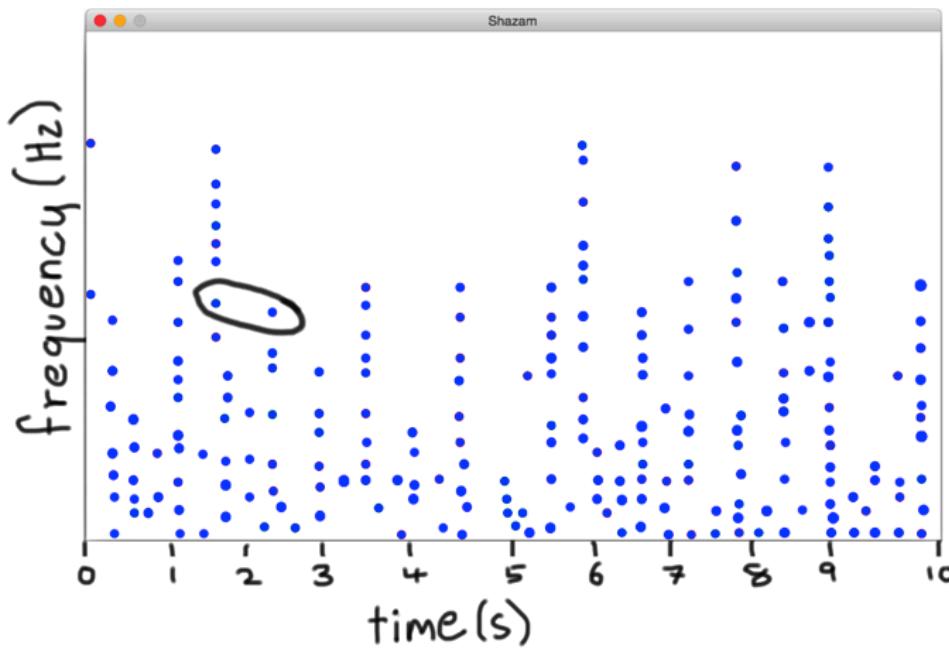
# Note Pair Hashing



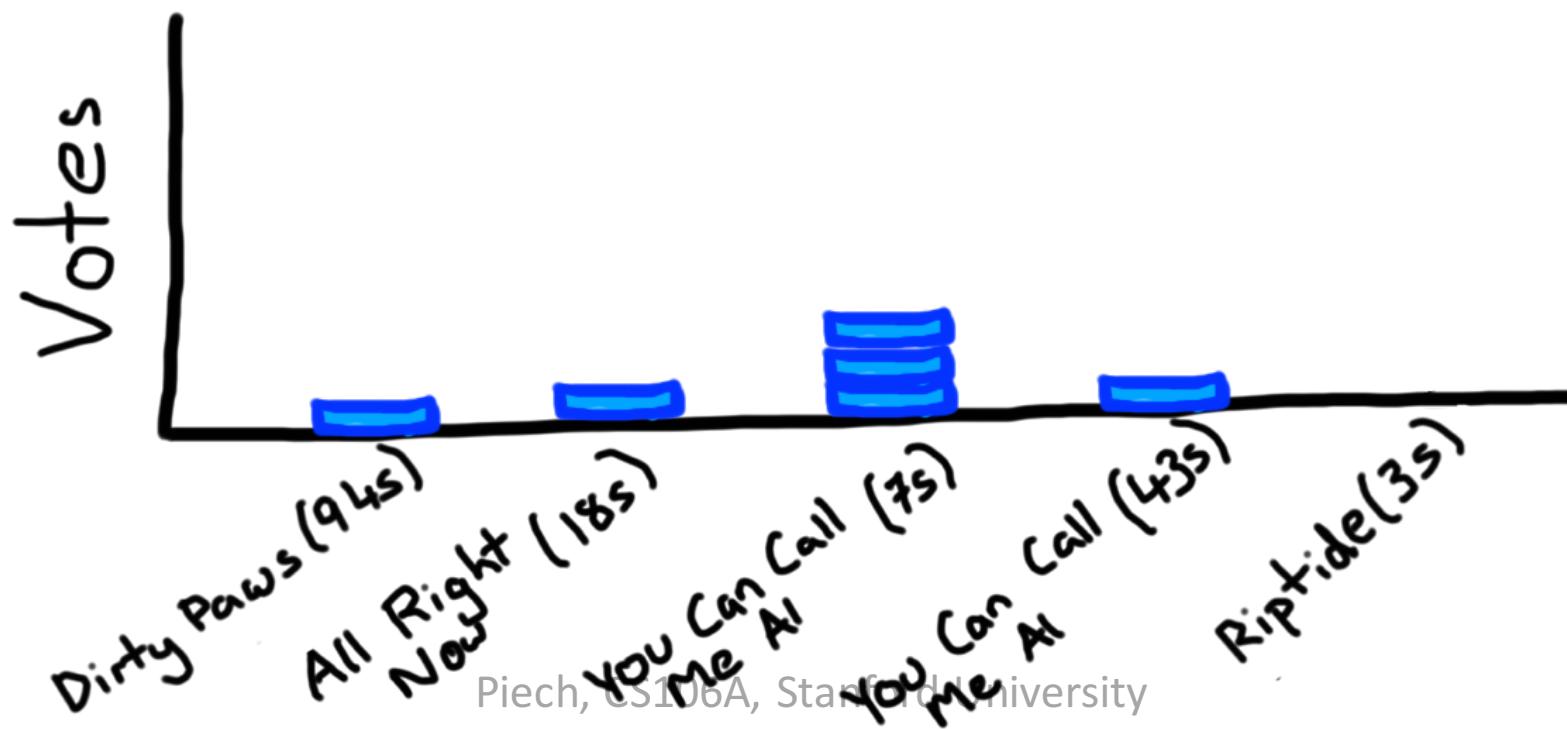
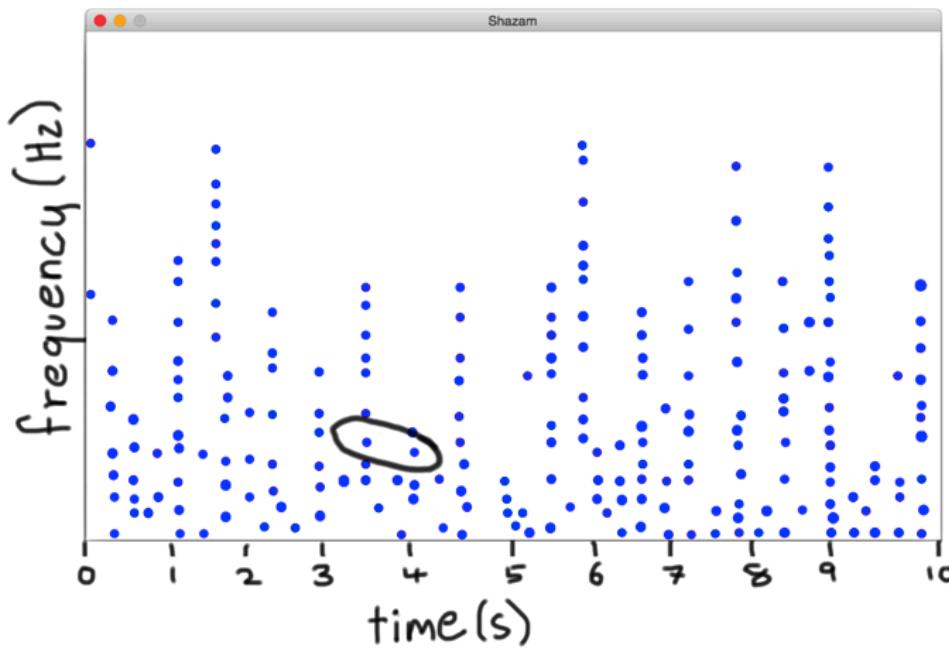
# Note Pair Hashing



# Note Pair Hashing



# Note Pair Hashing

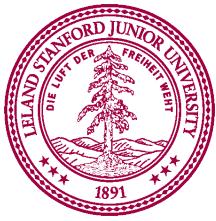


# Google Maps

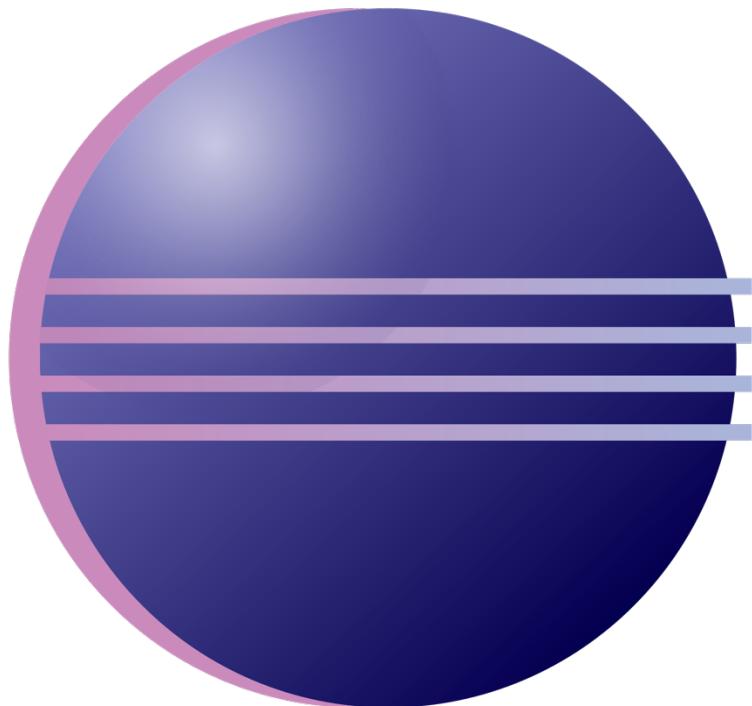


# C++

Piech, CS106A, Stanford University



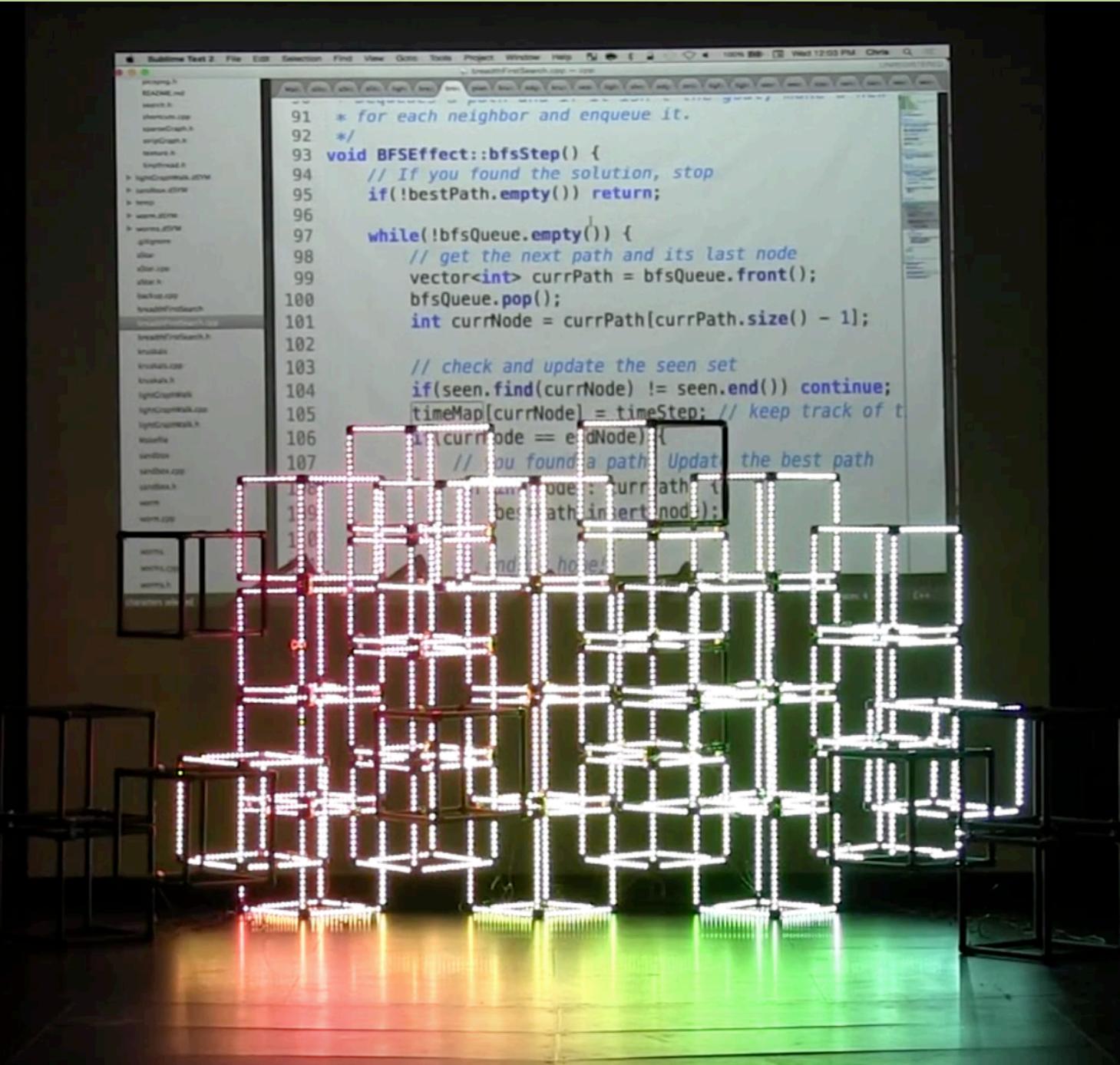
Eclipse is the ide for Java



Eclipse is the ide for C++  
(CS106B)



# CS106B For Art



# CS106B

## Java in the Wild

## Other Languages

Piech, CS106A, Stanford University



# CS106B

## Java in the Wild

## Other Languages

Piech, CS106A, Stanford University



# Java in the wild

# There is more Java to be learned

switch

Interface

main

@Override

casting



# Main

```
public class Breakout extends GraphicsProgram {  
  
    public void run() {  
        // your code  
    }  
  
    public static void main(String[ ] args) {  
        new Breakout().run();  
    }  
}
```



# Switch

```
String getMonthName( int monthNum )
```

8      “August”

1      “January”



# Without Switch

```
String getMonthName(int monthNum) {  
    if(monthNum == 1) return "January";  
    if(monthNum == 2) return "February";  
    ...  
    if(monthNum == 12) return "December";  
}
```



# With Switch

```
String getMonthName(int monthNum) {  
    switch(monthNum) {  
        case 1: return "January";  
        case 2: return "February";  
        ...  
        case 12: return "December";  
    }  
}
```

\*Beware, switch has unexpected behavior if you have a return or end in a break statement



# Switch, now with Strings

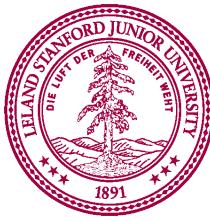
```
String requestReceived(Request request) {  
    switch(request.getCommand()) {  
        case "ping": codeForPing break;  
        case "setStatus": codeForSetStatus break;  
        ...  
    }  
}
```

\*Beware, switch has unexpected behavior if you have a return or end in a break statement



# Casting

```
int x = 5.8;  
-----|
```



# Casting

```
int x = (int)5.8;
```

- \* Floors the number (this results in 5)



# Casting

Take this value

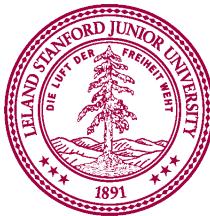
```
int x = (int)5.8;
```

And force it to conform to  
this type



# Casting

```
double y = 5.8;  
int x = (int)y;
```



# Not everything can be cast

```
String s = (String)5.8
```



\*



# Not everything can be cast

```
double x = (double)"5.2";
```

-----  
-----  
-----  
-----  
-----  
-----  
-----

\*



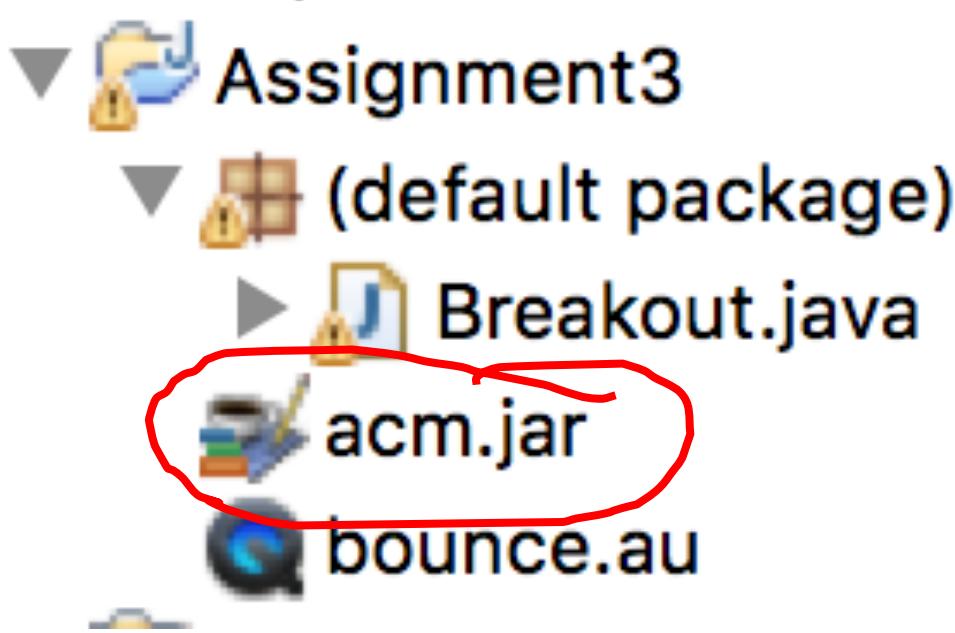
# Back to our good old friend

```
// convert from double to string
String s = "" + 5.2;

// convert from string to double
double x = Double.parseDouble("5.2");
*
```



# ACM and other libraries



# How to make an “executable”

## Java **A**rchive File



Eg FacePamphletClient.**jar**



# You are ready to self-learn



Piech, CS106A, Stanford University

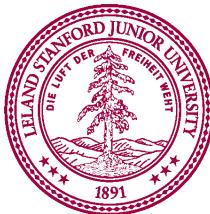


# CS106B

## Java in the Wild

## Other Languages

Piech, CS106A, Stanford University



# CS106B

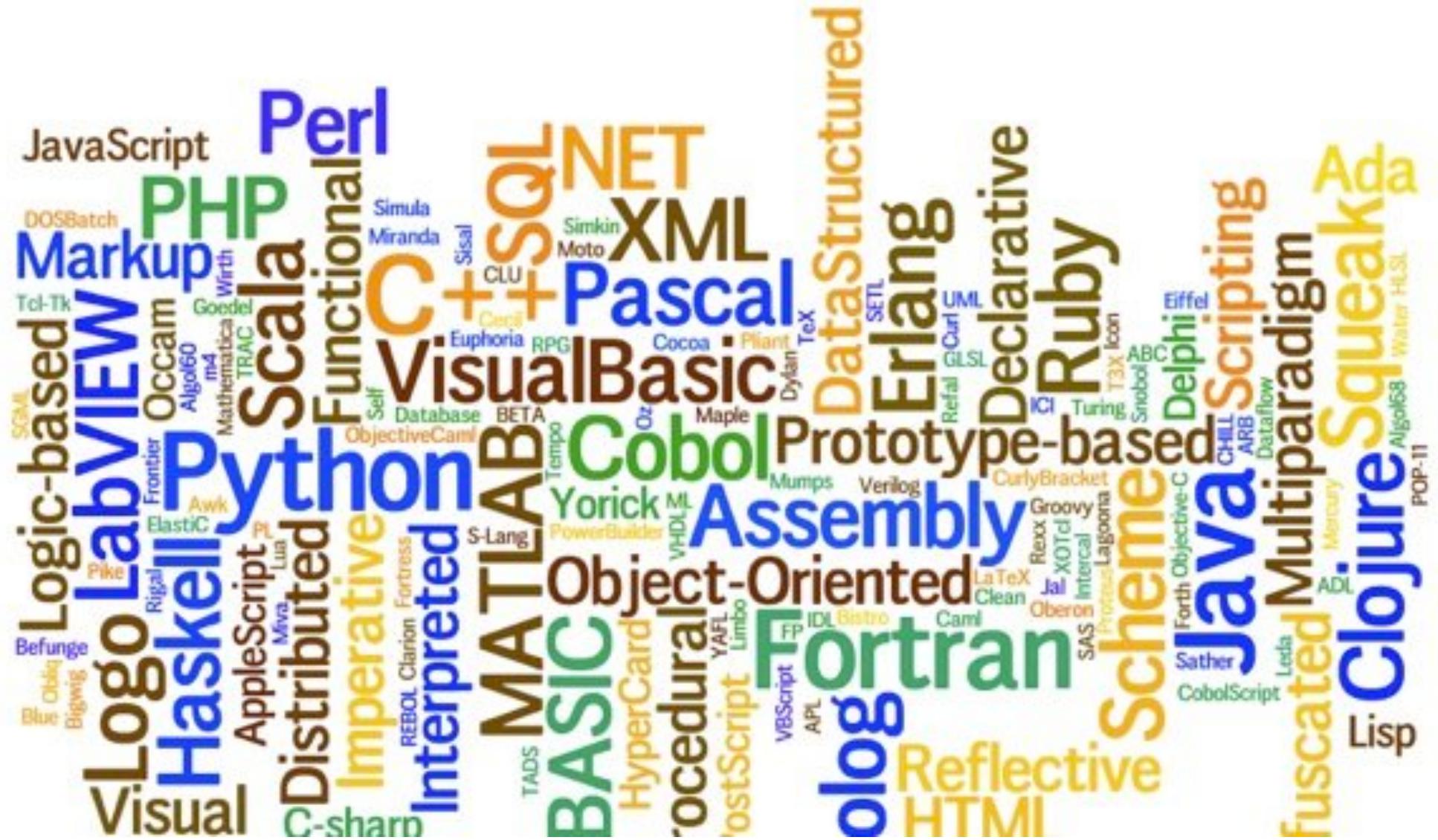
## Java in the Wild

## Other Languages

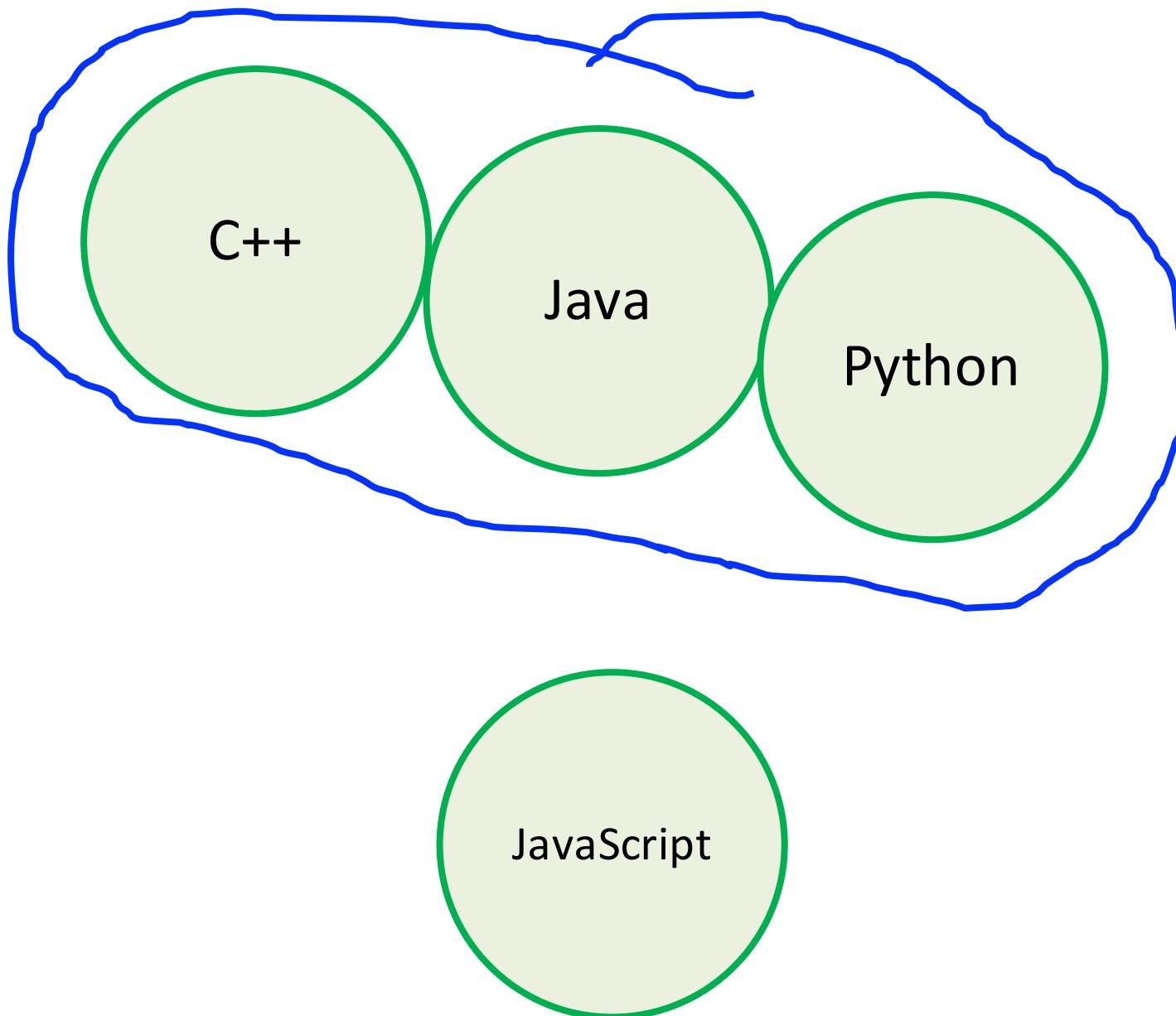
Piech, CS106A, Stanford University



# Other Languages



# More like dialects



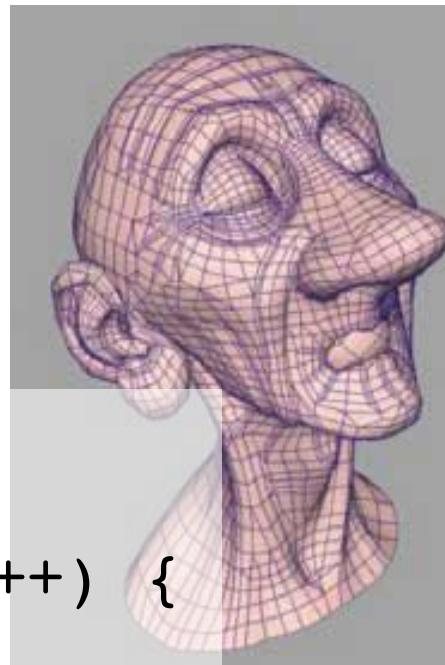
# C++

// Java

```
ArrayList<Double> evens = new ArrayList<Double>();
for(int i = 0; i < 100; i++) {
    if(i % 2 == 0) {
        evens.add(i);
    }
}
println(evens);
```

// C++

```
Vector<double> evens;
for(int i = 0; i < 100; i++) {
    if(i % 2 == 0) {
        evens.add(i);
    }
}
cout << evens << endl;
```



# Python

// Java

```
ArrayList<Double> evens = new ArrayList<Double>();
for(int i = 0; i < 100; i++) {
    if(i % 2 == 0) {
        evens.add(i);
    }
}
println(evens);
```

# Python

```
evens = []
for i in range(100):
    if i % 2 == 0:
        evens.append(i)
print list
```



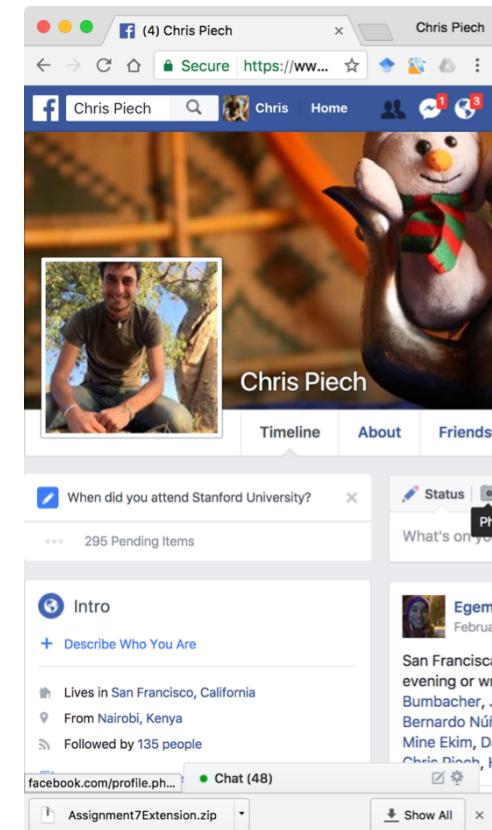
# JavaScript

// Java

```
ArrayList<Double> evens = new ArrayList<Double>();
for(int i = 0; i < 100; i++) {
    if(i % 2 == 0) {
        evens.add(i);
    }
}
println(evens);
```

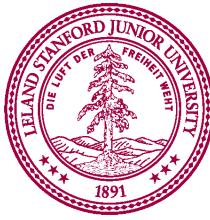
// JavaScript

```
var evens = []
for(var i = 0; i < 100; i++) {
    if(i % 2 == 0) {
        evens.push(i)
    }
}
console.log(list)
```



# Some may think:

## Computer science is vocational



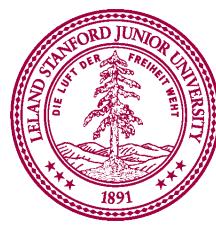
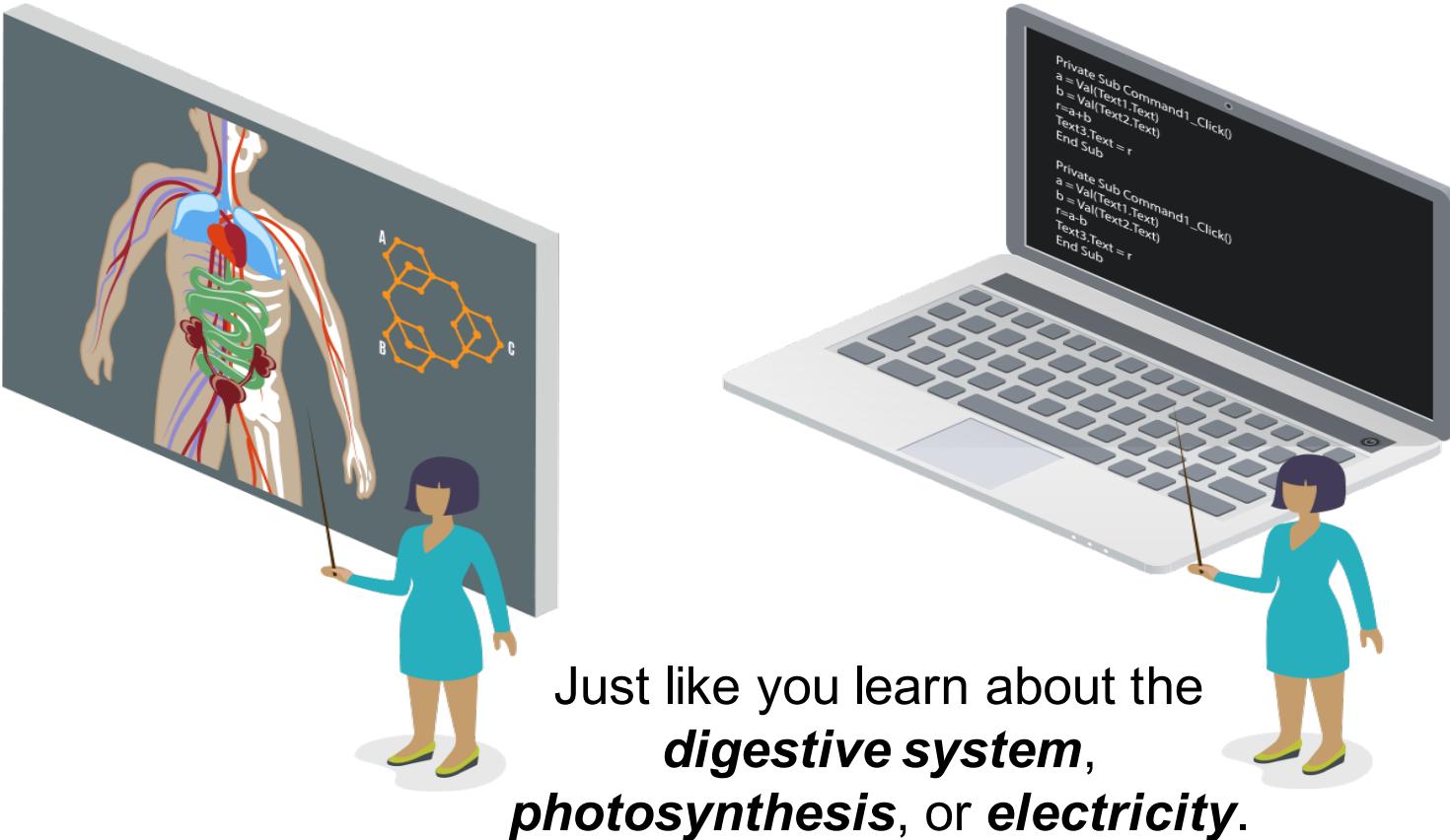
# Some may think:

~~Computer science is vocational~~

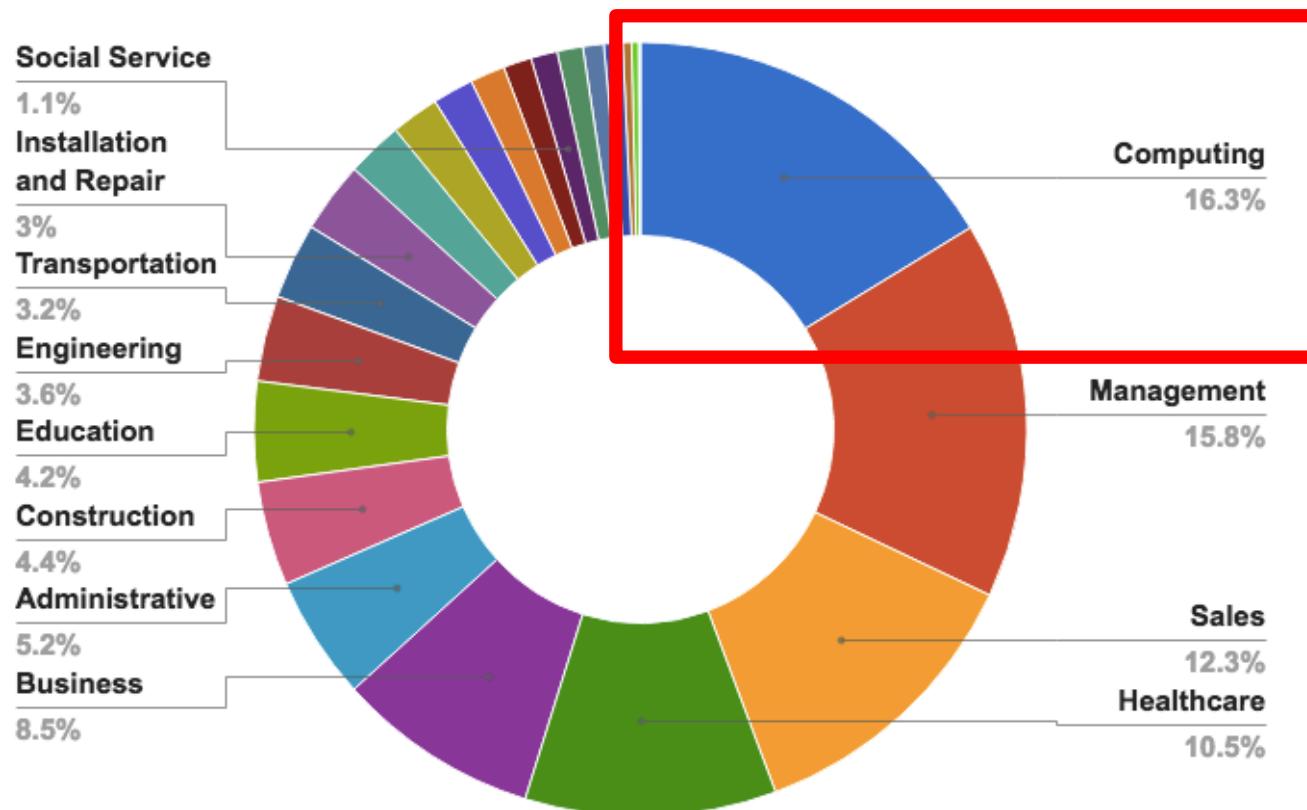
Computer science is  
foundational



# Computational thinking is foundational



# But there are vocations involved 😊



500,000 current openings:  
These jobs are in **every** industry and **every** state, and they're projected to grow at twice the rate of all other jobs.

Source: Brookings Institute via Code.org



Acknowledge our practice