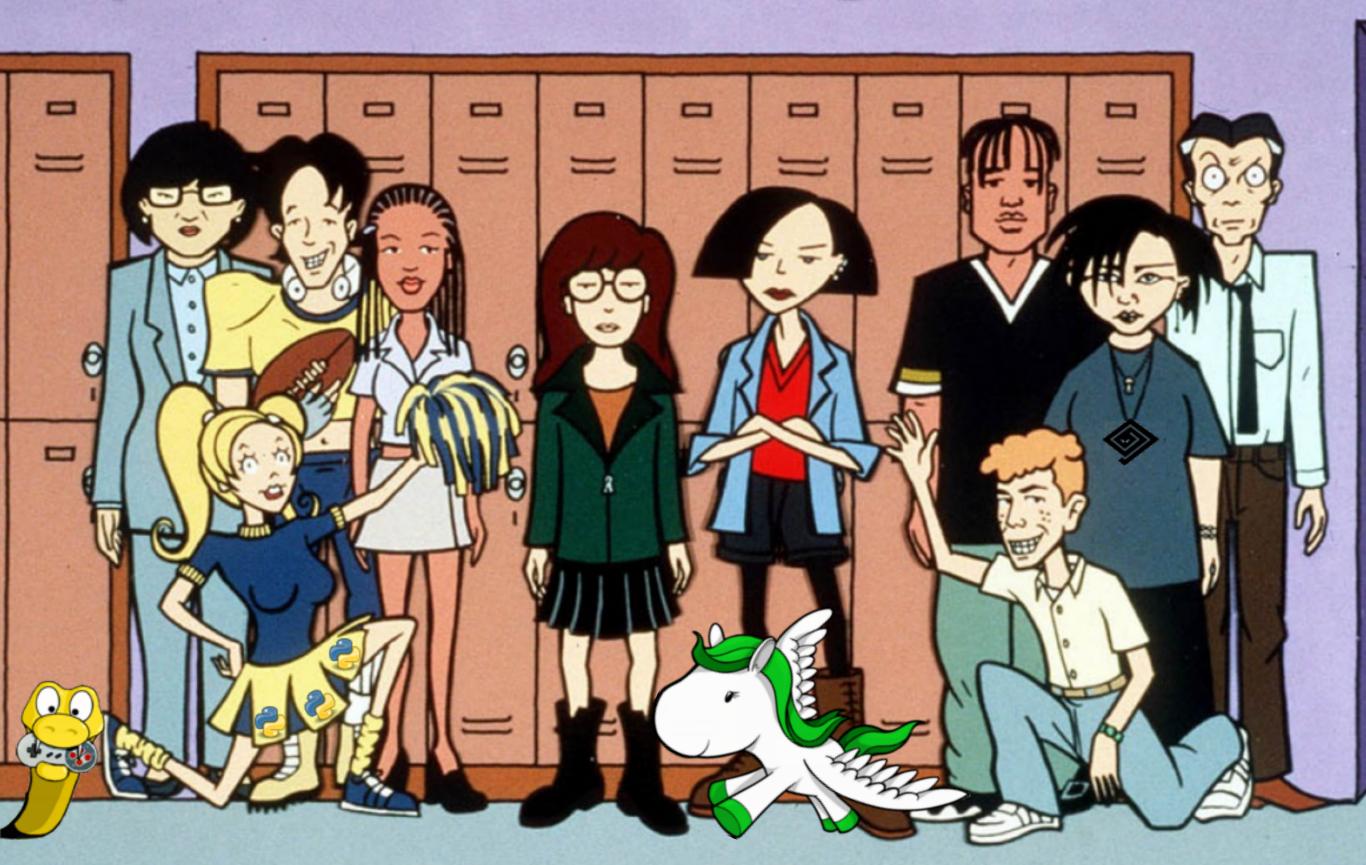
## Python, the next generation

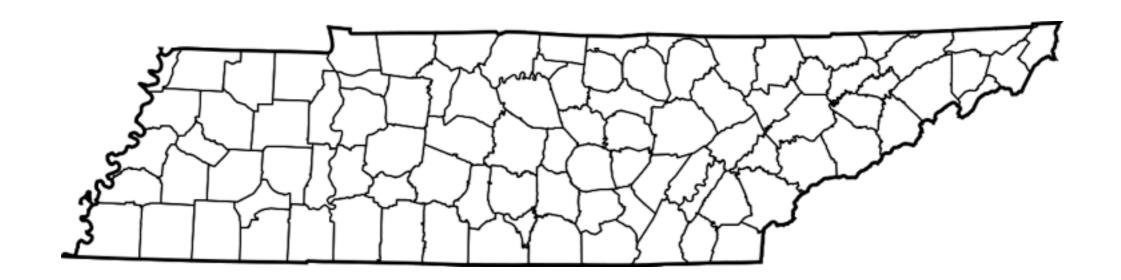








#### ~285,000 high school students in TN



How many are taking AP CS?



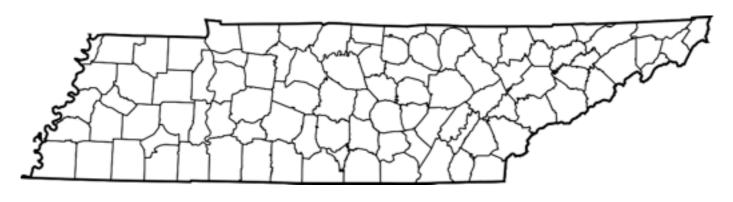












I



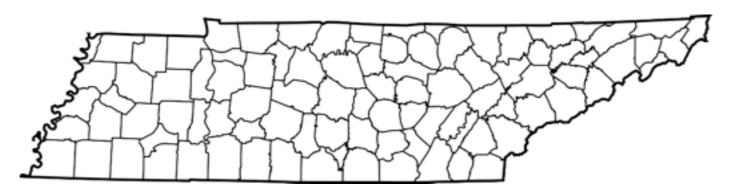












25 I 0.09%









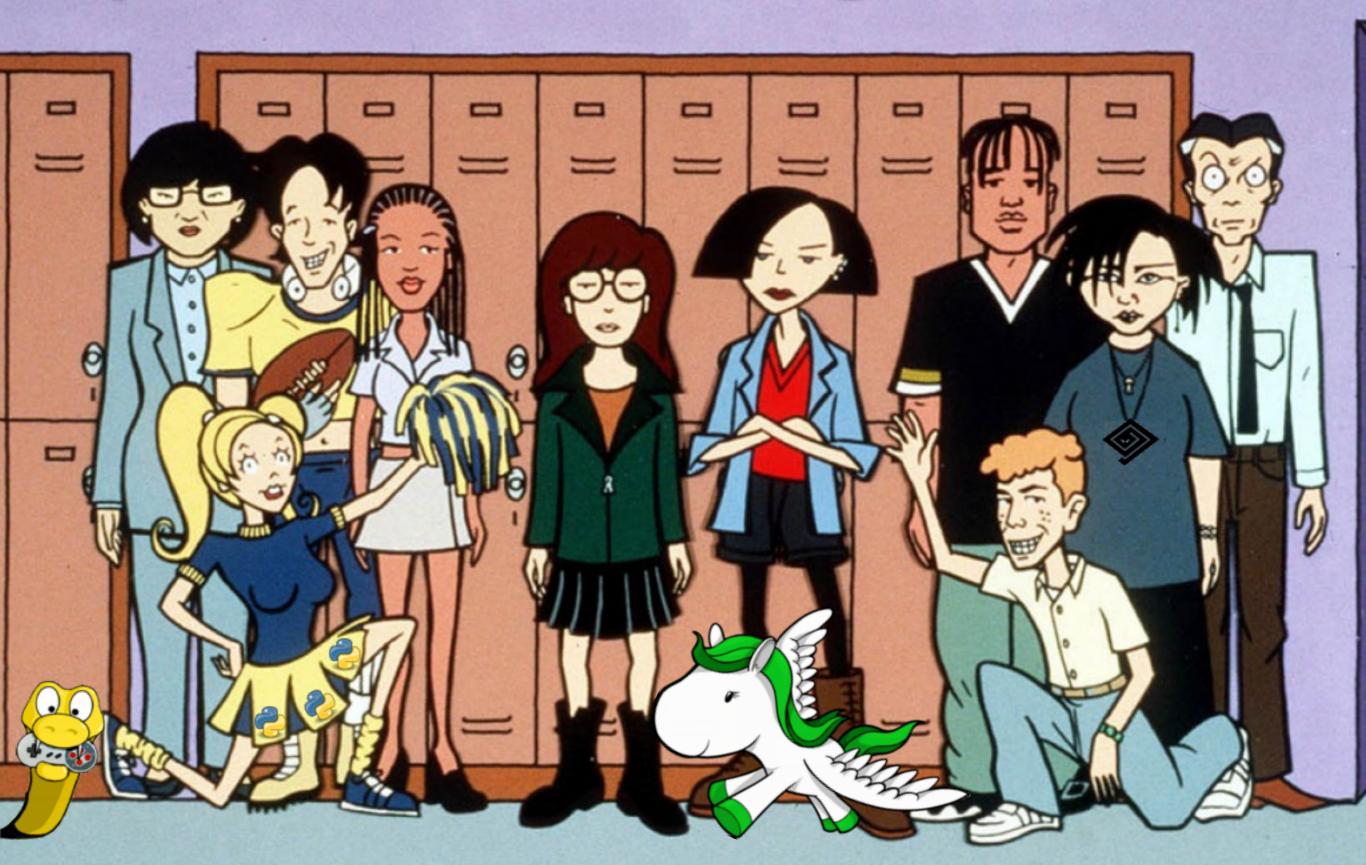


#### Organizer



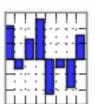
@jessicamckellar http://jesstess.com

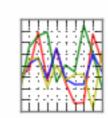
## Python, the next generation

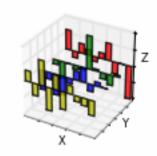


# A few more statistics









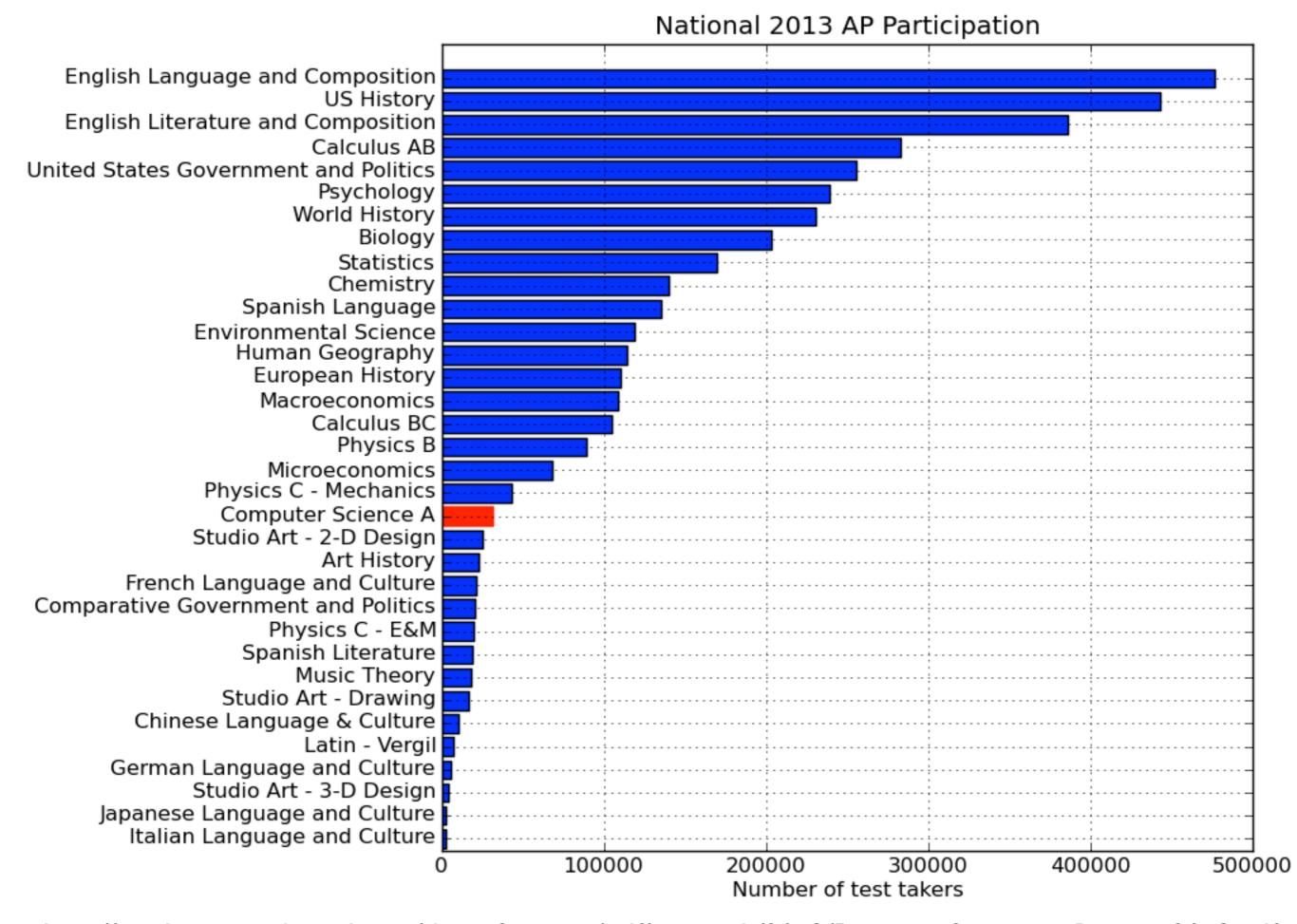




27,102,636
have learned an
HOUR of CODE™

Anybody can learn.

Start



http://media.collegeboard.com/digitalServices/pdf/research/2013/Program-Summary-Report-2013.pdf

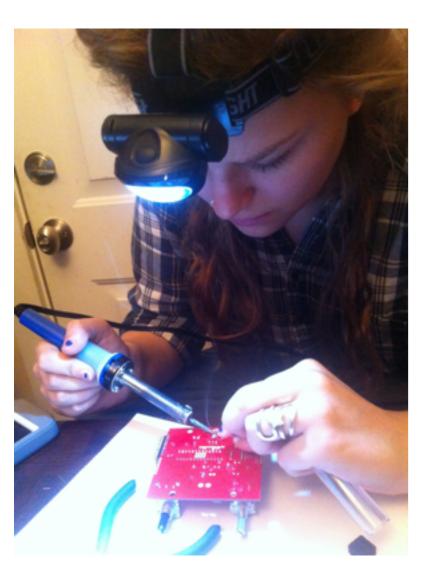


#### **CTE ELECTIVES:**

BUS3718F/S Computer Applications BUS7512F/S Business Management

SST3696F/SB IB Business & Mgmt I

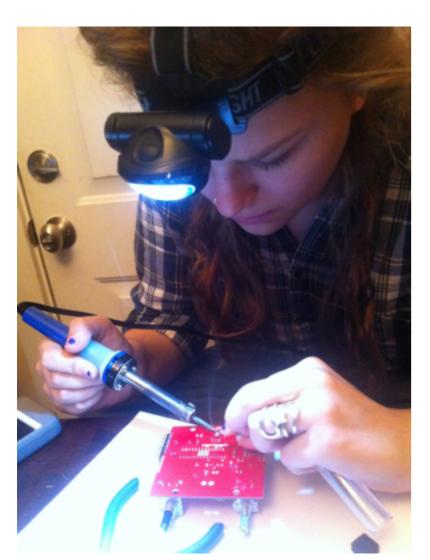
SST3896F/S HSE8590F/SC VOC8177F/SB IB Business & Mgmt II Medical Terminology Digital Art/Design





#### **CTE ELECTIVES:**

BUS3718F/S Computer Applications BUS7512F/S Business Management SST3696F/SB IB Business & Mgmt I SST3896F/S HSE8590F/SC VOC8177F/SB IB Business & Mgmt II
Medical Terminology
Digital Art/Design



2253 schools taught AP CS last year2465 | public high schools= 9.1% upper bound

http://nces.ed.gov/fastfacts/display.asp?id=84







#### In Tennessee

251 students took the exam 165 passed pass rate = 66%













#### In Tennessee

251 students took the exam 165 passed pass rate = 66%

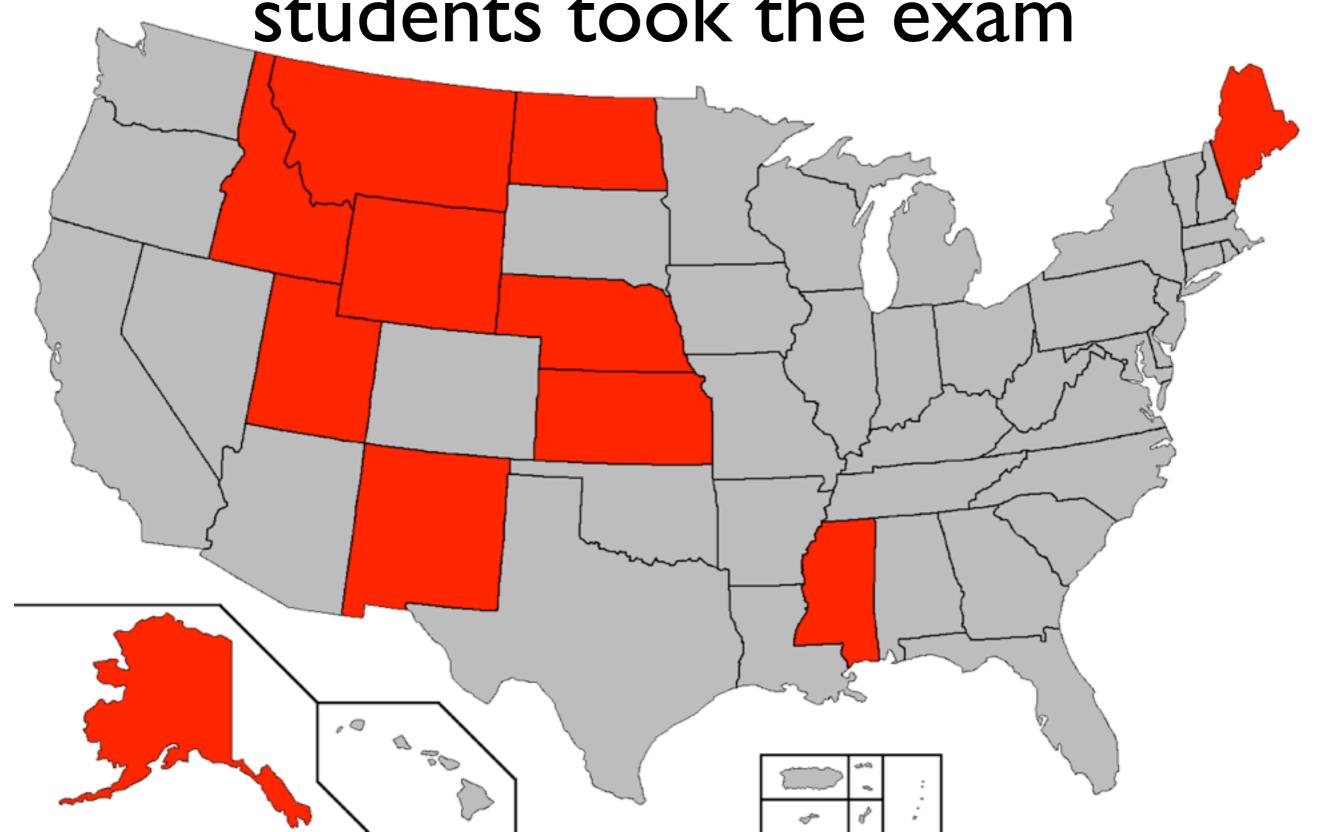
25 African American students took the exam pass rate = 32%







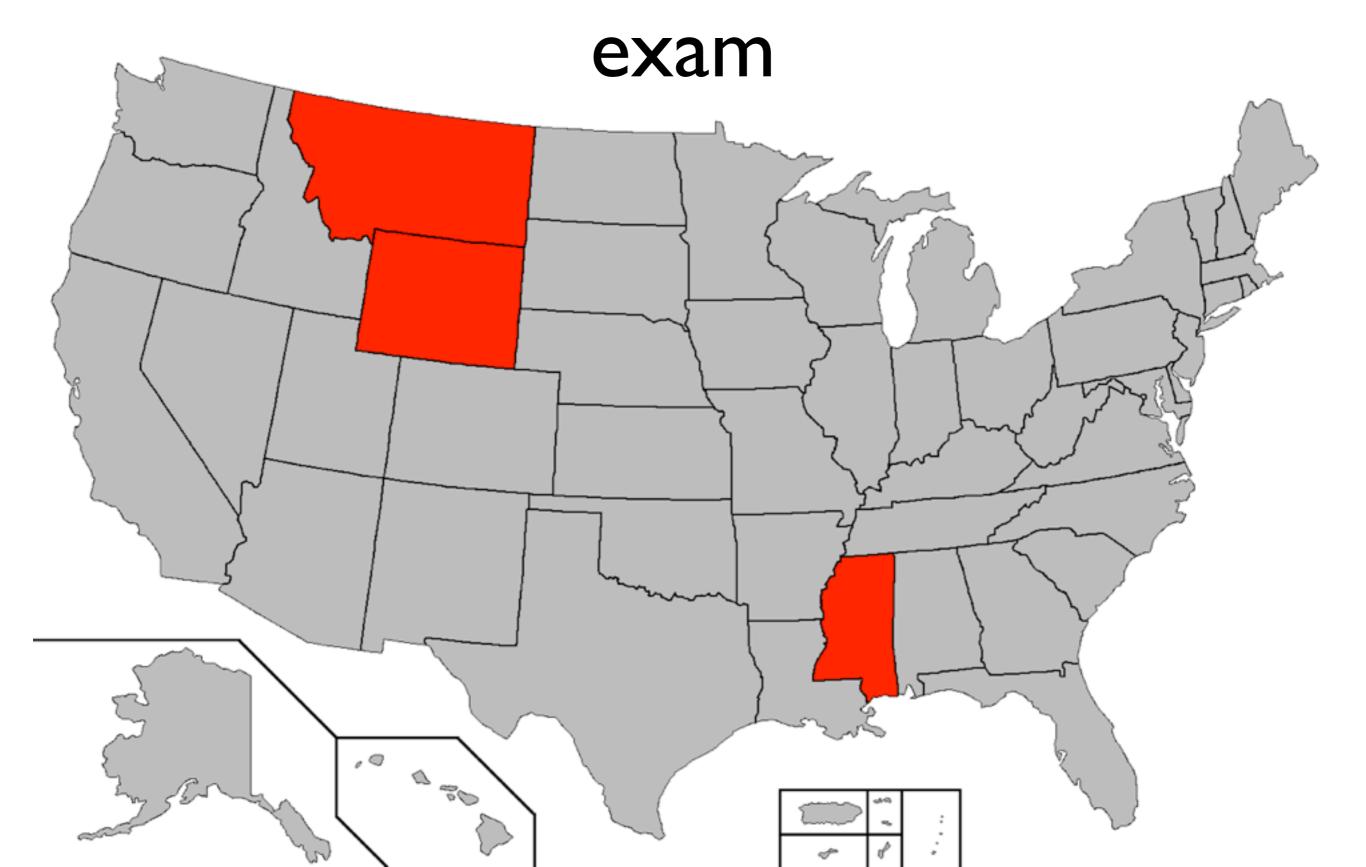
## States where no African American students took the exam

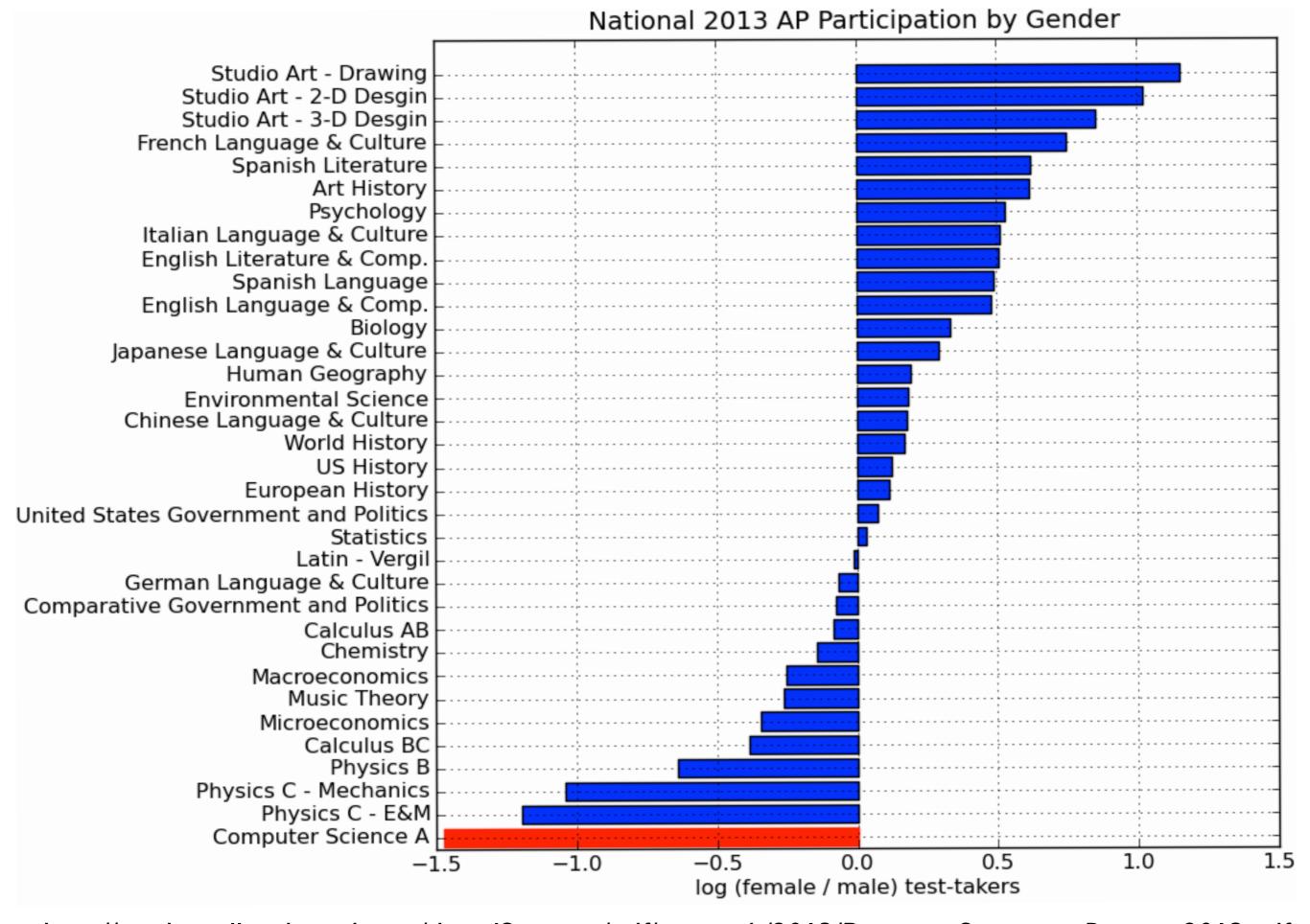


## States where no Hispanic students took the exam

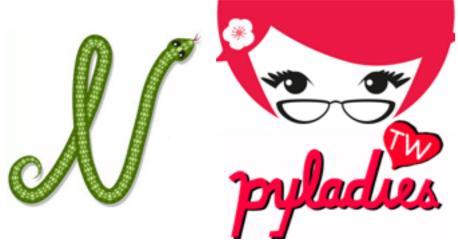


#### States where no girls took the





http://media.collegeboard.com/digitalServices/pdf/research/2013/Program-Summary-Report-2013.pdf

































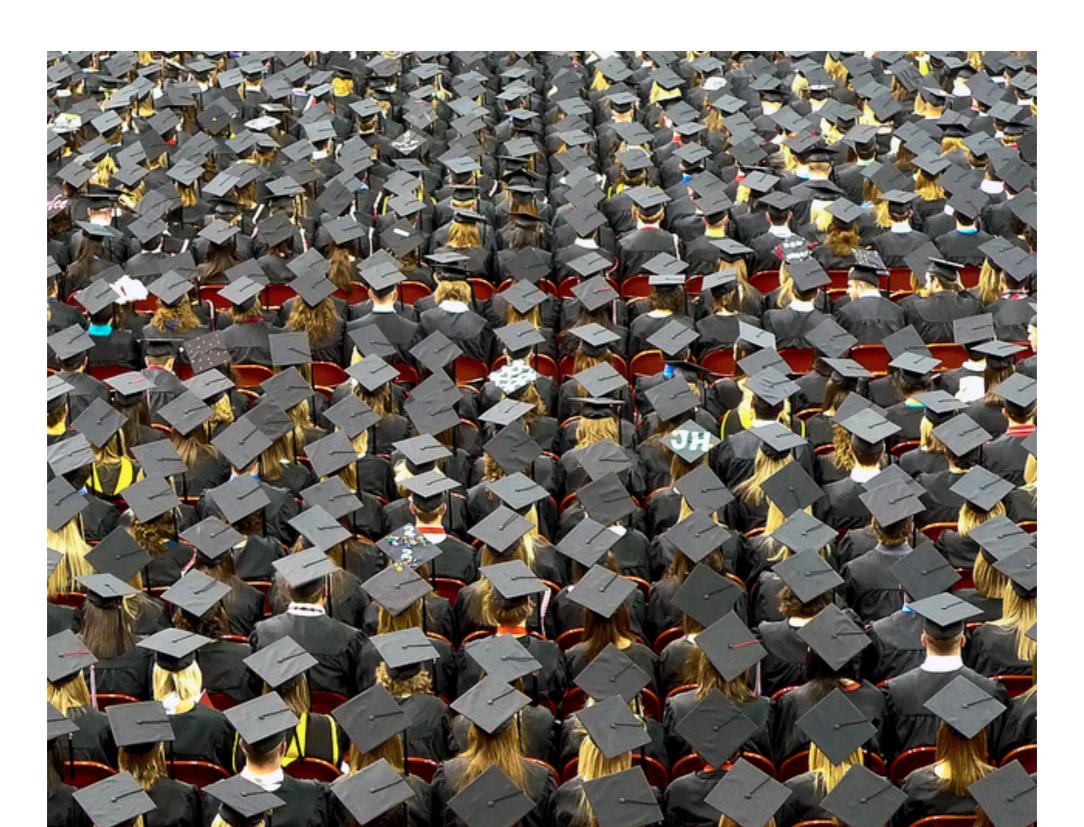
openhatch

code is fun

## Why am I focusing so much on AP CS?



#### 1. Incentives



#### 2. Data

19% of high school students who take AP CS pursue a computing degree.

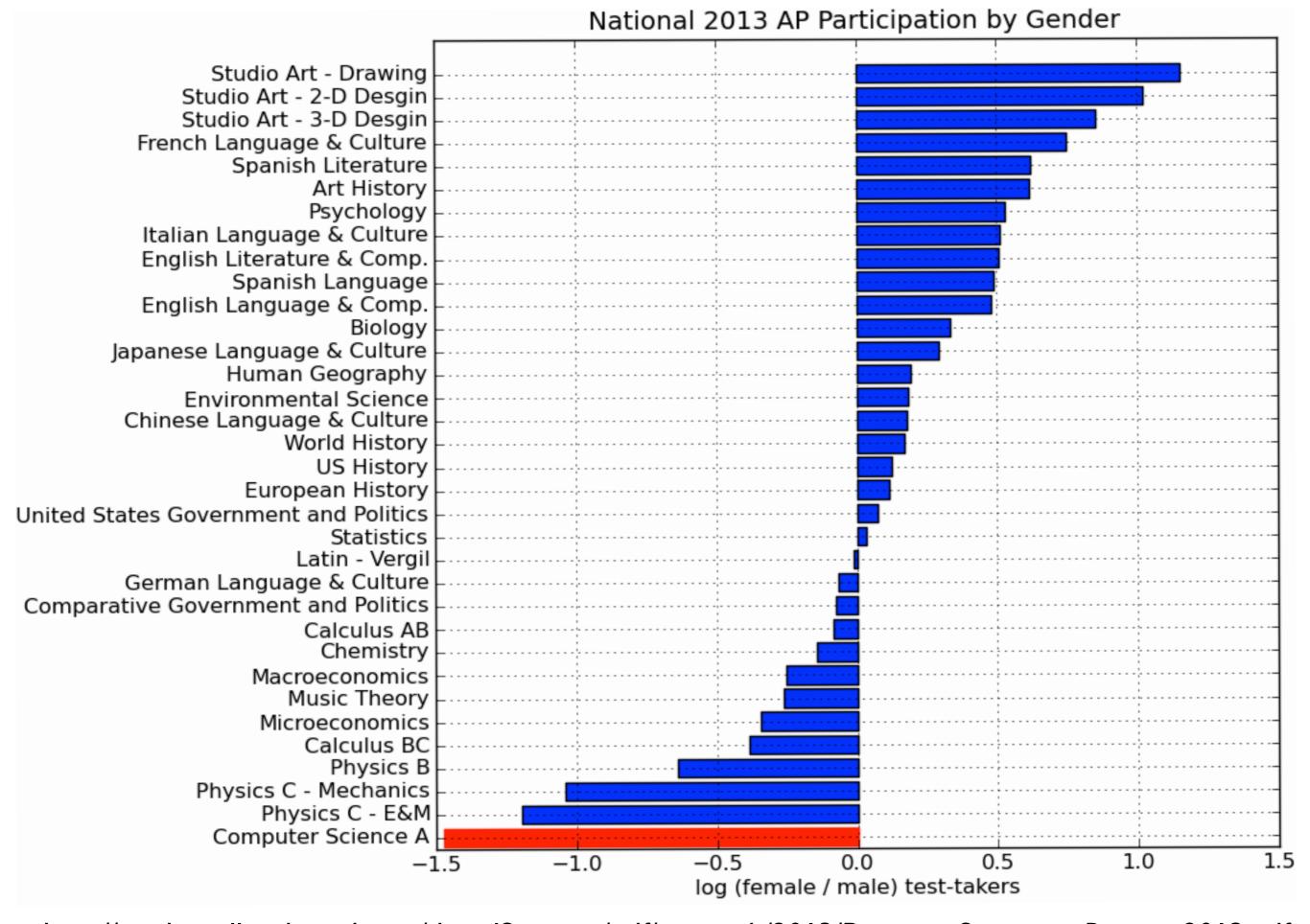
3% of students who don't take AP CS pursue a computing degree.

# Why does this matter to the Python community?

#### Why does this matter?

- I. We understand that programming is empowering.
- 2. The leaky pipeline affects our community.
- 3. We care about the long-term success of the language.

#### Well, what can we do?



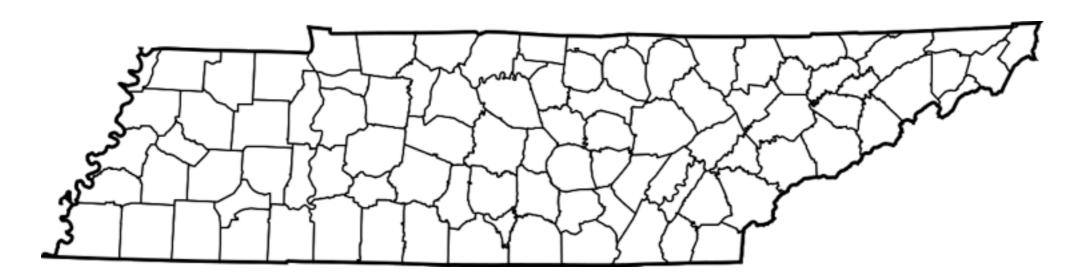
http://media.collegeboard.com/digitalServices/pdf/research/2013/Program-Summary-Report-2013.pdf







## 29% of AP CS test takers in Tennessee were girls.







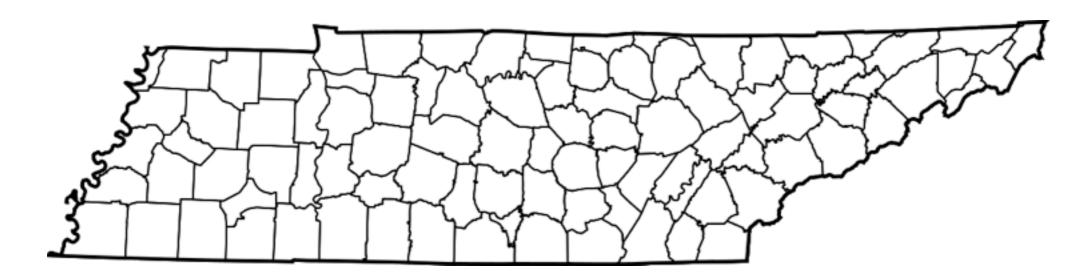








## 29% of AP CS test takers in Tennessee were girls.



Guess why.















This teacher, Jill Pala.

Girls Preparatory School
Chattanooga, TN
Taught 30 / 71 girls who took the exam









## 1 motivated teacher can set a record.

# What can a 200,000 member community do?



Groups 607

Members **211,911** 

Interested 43,416

Cities 269 Countries 54

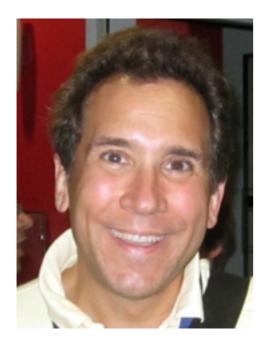


#### Barbara Ericson

2010 Karl V. Karlstrom Outstanding Computing Educator Award recipient

Author, Introduction to Computing and Programming in Python: A Multimedia Approach

Researcher who did the AP CS 2013 exam results analysis



Dr. Mark Guzdial

2010 Karl V. Karlstrom Outstanding Computing Educator Award recipient

Author, Introduction to Computing and Programming in Python: A Multimedia Approach

Lead PI on Georgia Computes!



Dr. Yasmin Kafai

Early developer and researcher on the Scratch language

Author, Under the Microscope: A Decade of Gender Equity Interventions in the Sciences

Professor of Learning Sciences at the University of Pennsylvania Graduate School of Education



#### 4 big areas

- Policy
- Student engagement
- Supporting teachers
- Curriculum development





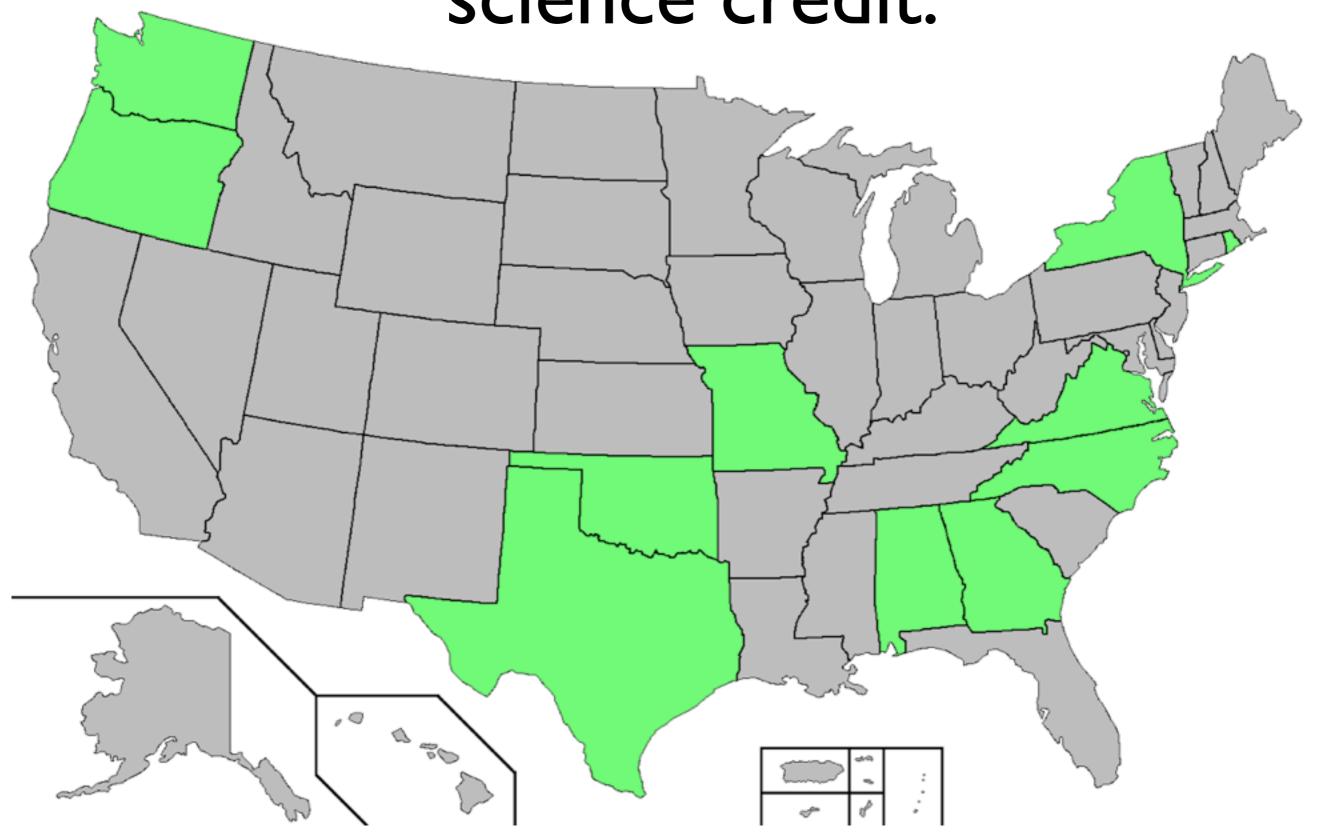




## Policy



## States that count CS for math or science credit.

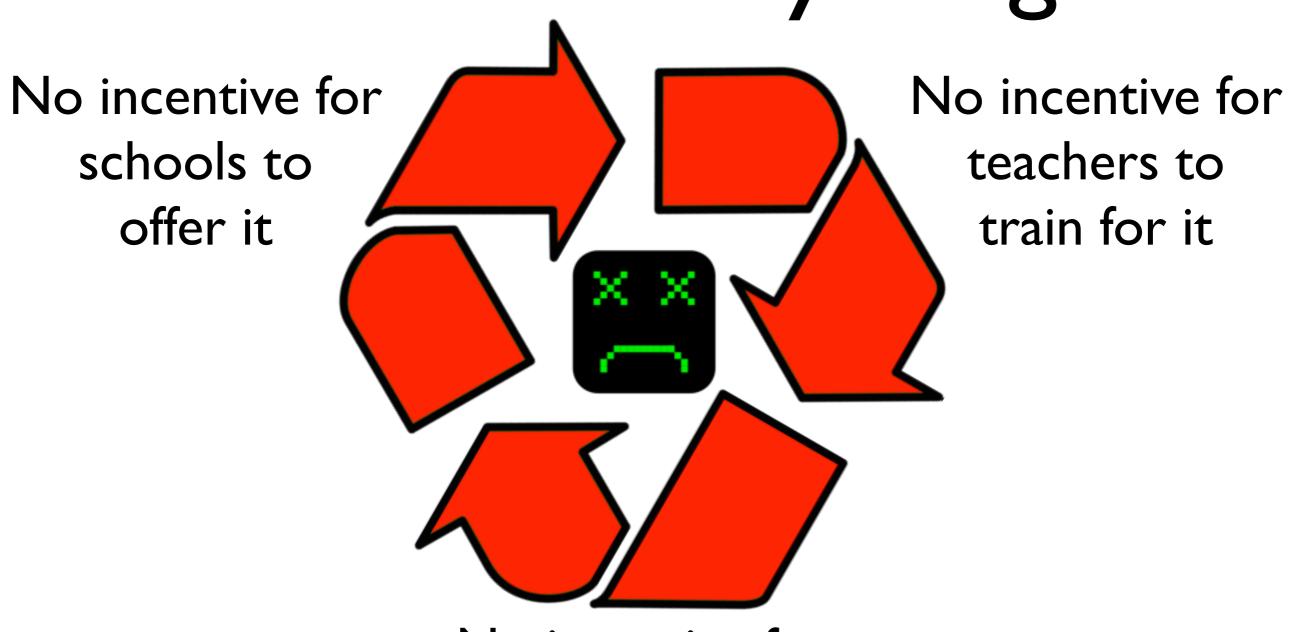


#### Problem

Computer science is only an elective in most states.



# When a class doesn't count for anything



No incentive for students to take it

#### Action

Ask your legislators and school board to count CS for math or science credit.



#### Problem

Comprehensive per-state data on decision makers and credentials doesn't exist!



#### Action

Python + web scraping + version control = better data for policymakers.



# Specifically, let's open source 2 documents:

- An audit of who sets graduation requirements for each state.
- An audit for how credentialing works for each state.



And automate the data acquisition process!

#### Problem



#### AP CS is still taught in Java



# AP CS through the years

lava

2003 - ? (II+ years)

C++

1999 - 2003 (6 years)

Pasca 1984 - 1999 (15 years)

### Reid's List, 2012

**Programs** 

#### 4. THE TWENTY-SIXTH REID LIST

#### Table 4. The programming language(s) used and the frequency of occurrence

	<del> </del>		
<u>Language</u>	using it		
Java	197	C or Matlab	
C++	82	C++ or Matlab	:
Python	43	C++ and Resolve	
C	18	Haskell	:
Scheme or Racket	11	HTML/JavaScript	
Java with another language	9	Processing	:
Visual Basic	7	Processing / Java	:
Ada	5	Python/Java	:
C/C++	4	Python or Java	:
Ada or Python	2	Python or C#	:
Alice and Java	2	Python or C# or Matlab	:
Alice	1	Scheme/Python	:
C#	1	Visual Basic or C#	:

### Reid's List, 2012

"The growth in Python's popularity is undeniable. Not only have more schools reported using it in their first programming course, but responding faculty talk about having adopted it, adopting it either last year or this coming year or how their programs are seriously considering the change."

#### Action

Engage College Board with the facts on what teachers want.



### Policy opportunities

- Advocate for CS as math or science credit.
- Audit who sets graduation requirements for each state.
- Audit how credentialing works for each state.
- Update and open source Reid's List.



 Engage College Board about Python as the next gen AP language.

# Student engagement



#### Problem

Students don't know what CS is, so they don't want to take it.

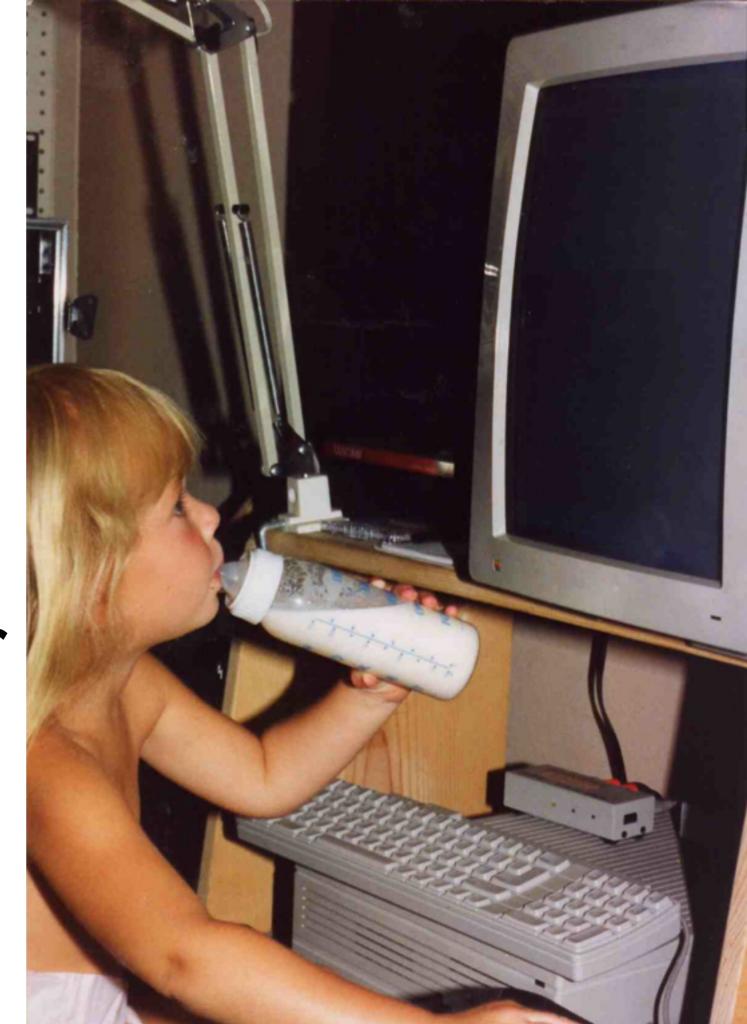


(Me on an Apple Mac Ilci, circa 1989)

#### Action

Support opportunities for early exposure.





### Summer camps





(PSF-sponsored Teen Tech Camp, Southwest Durham Regional Library)

Photo credits: @juliaelman, @rmurphey

## Girl Scouts, Boy Scouts





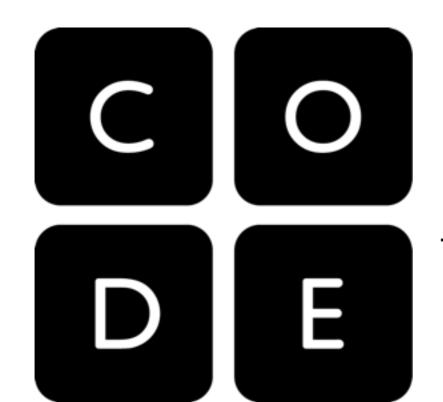
print("hello!")

(Actual badges you can buy from adafruit.com)



## After school programs





https://code.org/learn/local



# Take advantage of existing infrastructure for engaging students.



# Student engagement opportunities

- Summer camps.
- Girl Scouts, Boy Scouts.
- After school programs.

```
print("hello!")
```



# Supporting teachers



#### Problem

CS teachers are usually all alone.



#### Action

Give them a community.

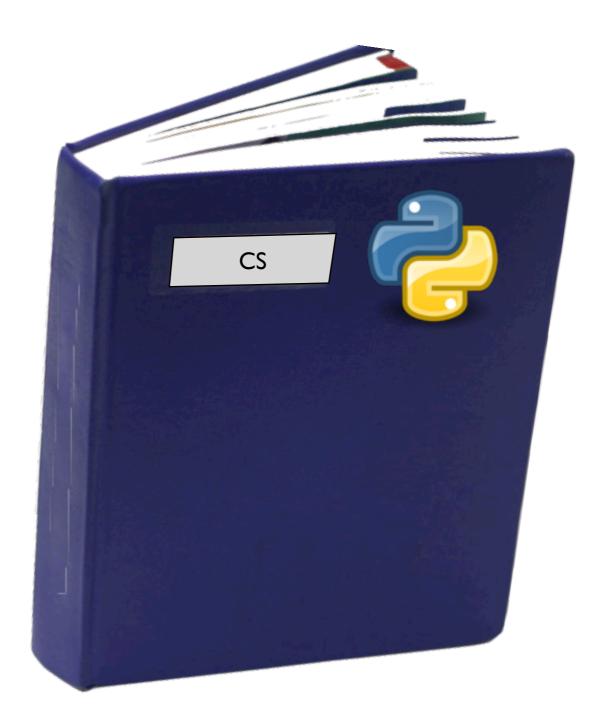


# Ways to support teachers

- Offer to answer lesson plan questions.
- Offer to be a TA.
- Offer to visit the class and talk about programming.
- Invite them to the local user group.
- Help connect them with other CS teachers.



# Curriculum development



# Did you know that there's a new AP CS?!





#### The CS Principles Big Ideas

I: Creativity

II: Abstraction

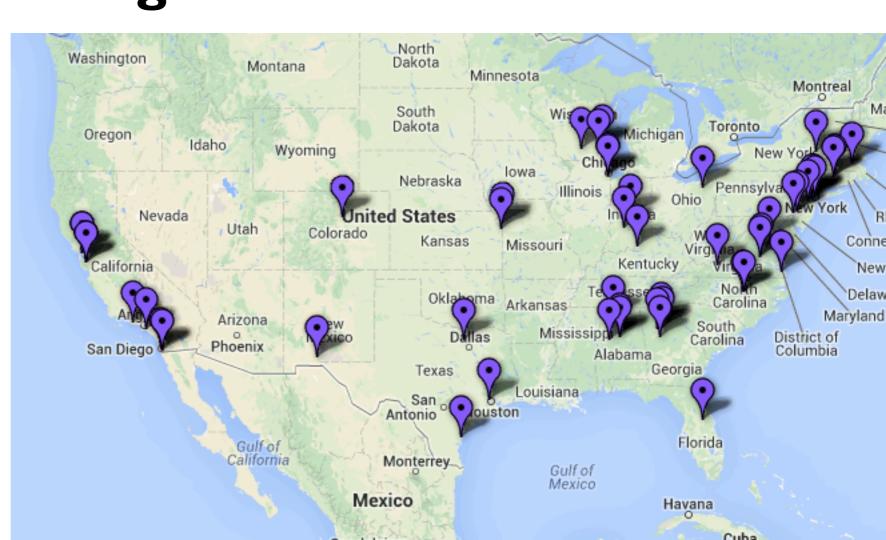
III: Data

IV: Algorithms

V: Programming

VI: The Internet

VII: Impact



#### Problem

There are no day-by-day curricula for CS Principles, in any language.



#### Action

This is a huge market opportunity for Python, let's seize it.



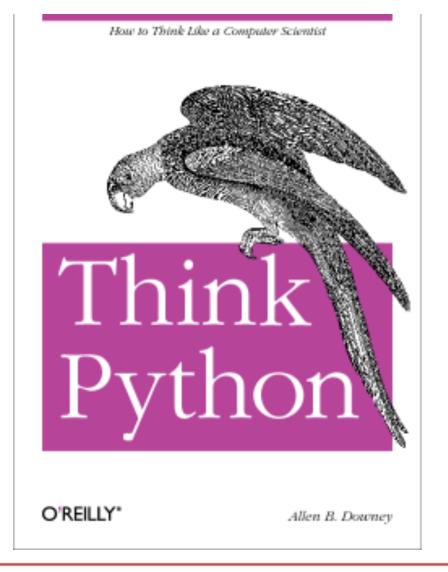


#### Lesson Plans

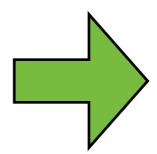
Teachers from the current CS Principles pilot have provided exemplar lesson plans that highlight key parts of the Big Ideas and Learning Objectives.

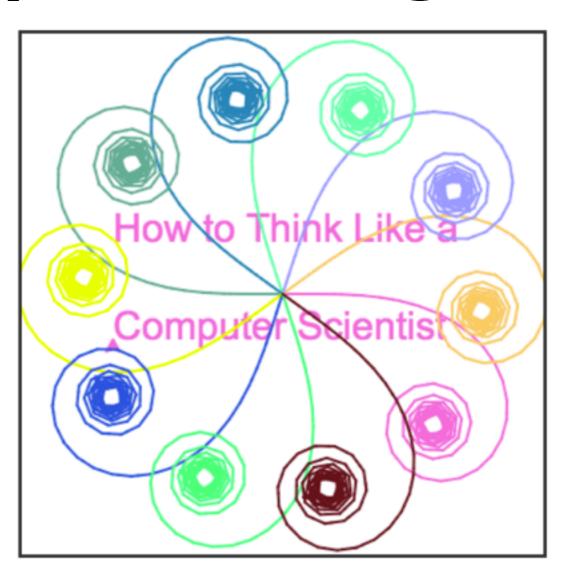
- Cryptography: Students understand both simple and complex encryption algorithms using online simulators
  - Big Ideas: Algorithms, Internet
  - Learning Objectives: 14, 27
- Data as Art, as Science, as a Reason for Being: Can Visual representations of data be considered a form of art? If your school were to display data in a public place, what would you present?
  - Big Ideas: Creativity, Abstraction, Data, Impact
  - Learning Objectives: 2, 9, 14, 28
- YouSort: An introduction to Sorting Algorithms. Before learning standard sorting algorithms, students create their own.
  - Big Ideas: Algorithms, Creativity
  - Learning Objectives: 4, 15, 16, 18

### interactivepython.org



for i in range(numTurtles):



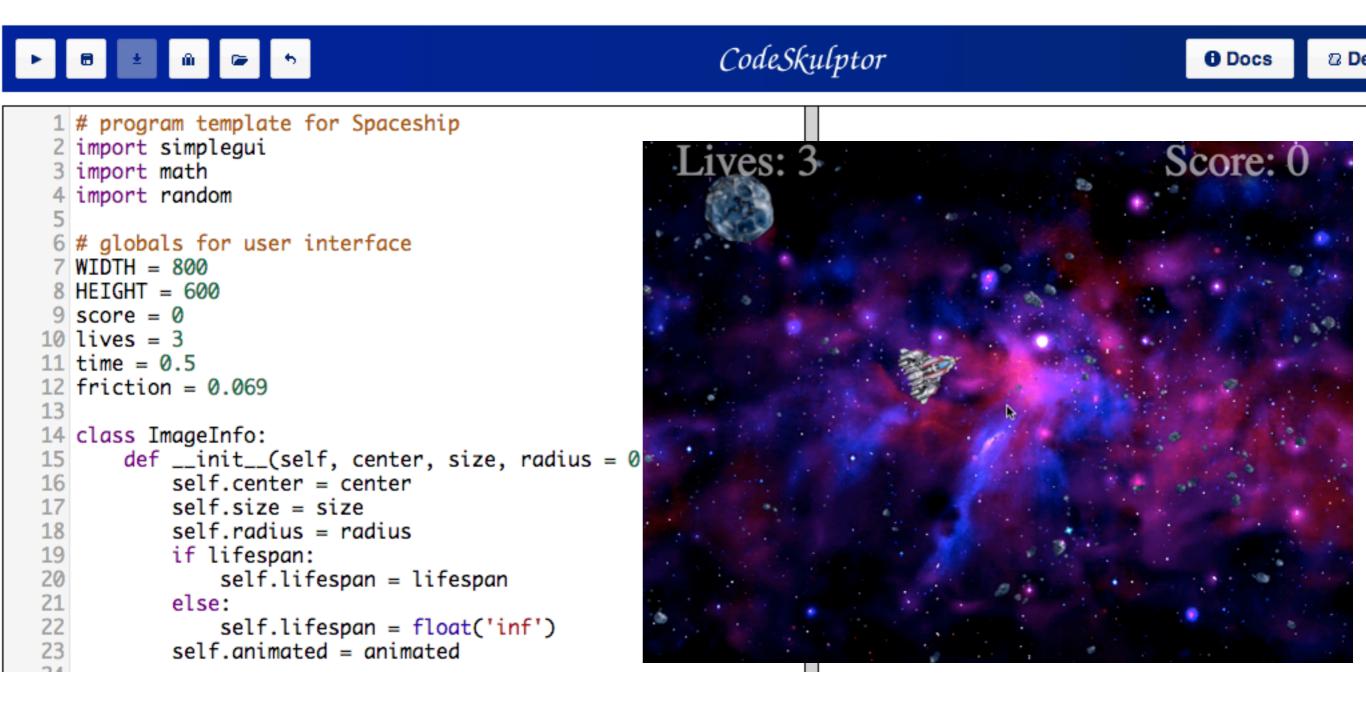


```
import turtle
import random

def main():
    tList = []
    head = 0
    numTurtles = 10

head = 10
head = 0
numTurtles = 10
head = 0
```

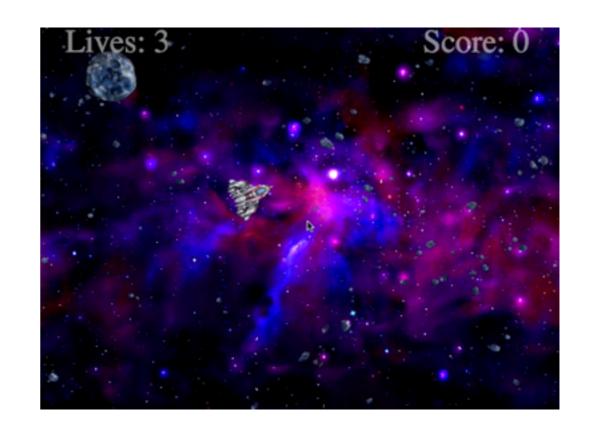
# Skulpt



https://github.com/skulpt/skulpt

# Curriculum development opportunities

- AP CS Principles
- interactivepython.org
- Skulpt





# 4 big areas

- Policy
- Student engagement
- Supporting teachers
- Curriculum development







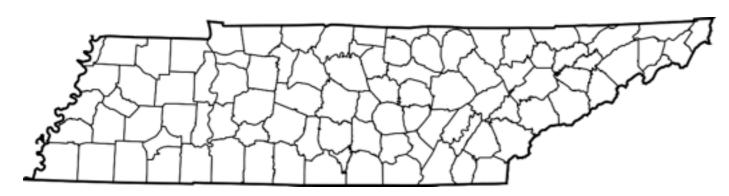




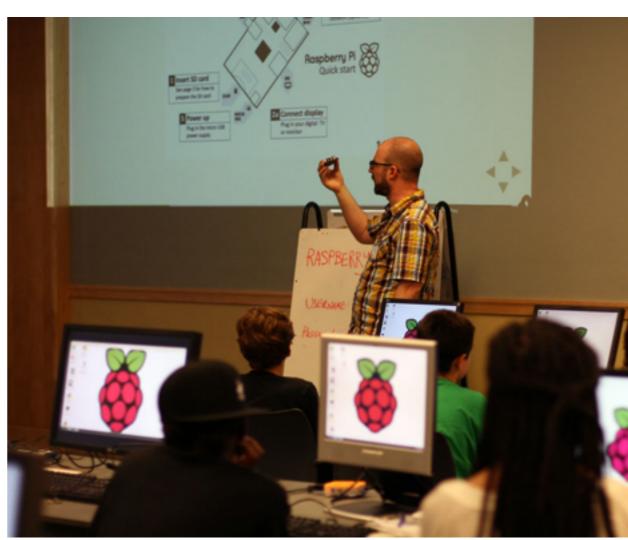








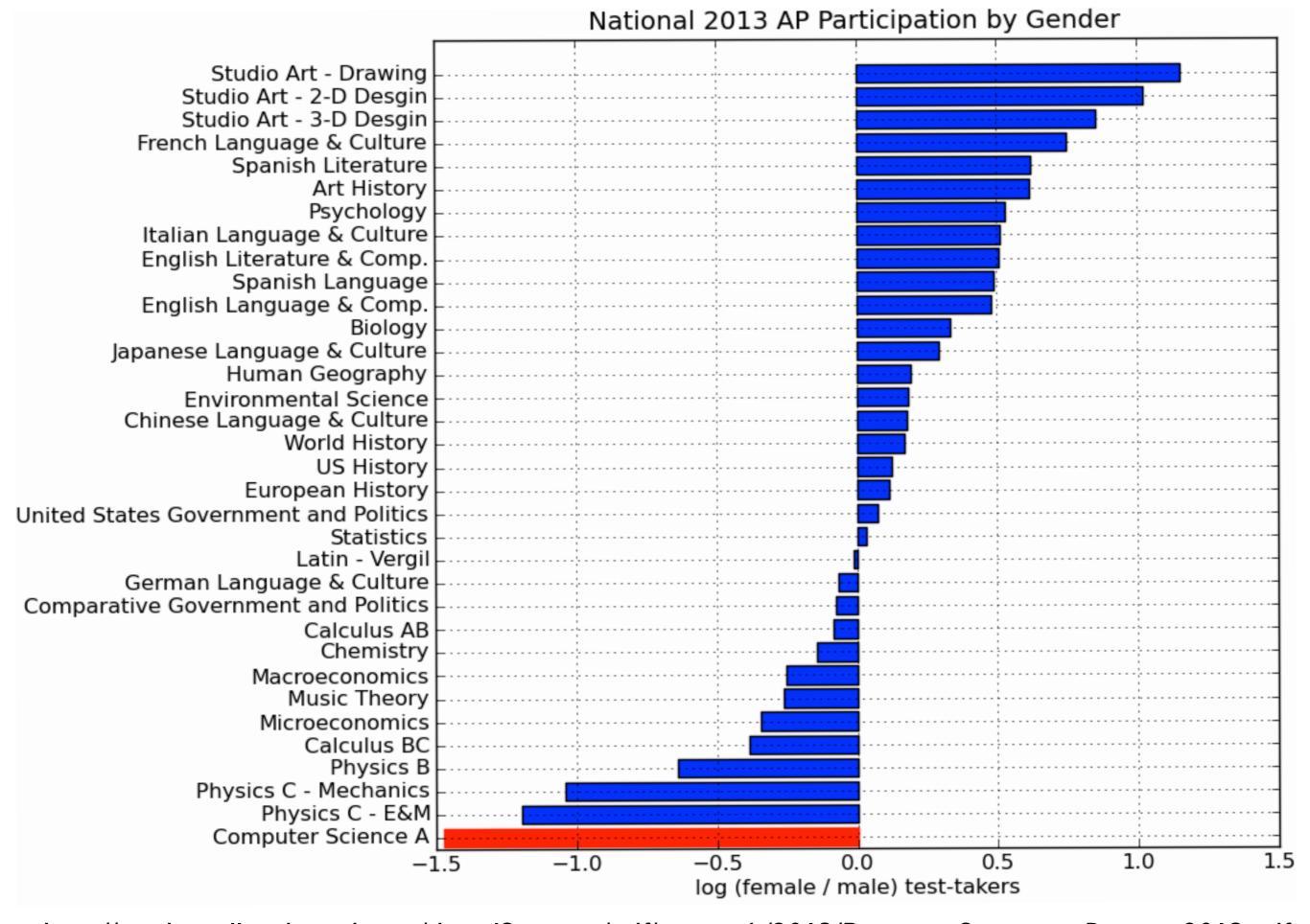
25 I 0.09%











http://media.collegeboard.com/digitalServices/pdf/research/2013/Program-Summary-Report-2013.pdf

# The Python Software Foundation



# Sprints <a href="http://pythonsprints.com">http://pythonsprints.com</a>



#### Outreach and Education

http://mail.python.org/mailman/listinfo/outreach-and-education



#### Grants

http://python.org/psf/grants/



# Our challenge, by

pytennessee

2015

NASHVILLE, TN

1 action.

## Our challenge, by

pytennessee

2015

NASHVILLE, TN



Jason Orendorff @jorendorff · 12m
Still a few more slots open for programmers. March 8. Teach, learn, code, have a blast. nashvillecode.org





#### Resources

- Unlocking the Clubhouse: Women in Computing
- Stuck in the Shallow End: Education, Race, and Computing
- Running On Empty: The Failure to Teach
   K-I2 Computer Science in the Digital Age
   http://www.acm.org/runningonempty/
- 2013 AP CS data
   http://home.cc.gatech.edu/ice-gt/556

# Thank you!



# Python, the next generation

