CompSci 101 Introduction

Susan Rodger

January 12, 2023

CompSci 101, Spring 2023 Home

Home | About | Dates | Labs | Assign | APTs | Help | Forms | Resources | Sakai

```
Write code in Python 3.6
1  def greeting(name):
2      greeting = "Hi " + name
3      if name=="Susan":
4        return greeting + ", old friend"
5      return greeting + ", nice to meet!"
6
7  print(greeting("Helen"))
8  print(greeting("Susan"))
9
```

Print output

```
Hi Helen, nice to meet!
Hi Susan, old friend
```

Compsci 101: Introduction to Computer Science

Course Description

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Due Dates

- **Sakai Quizzes on Prework (reading in textbook)**: due 10:15am on Lecture days. Take quizzes in Duke Sakai.
- **Labs**: weekly on Fridays, finish and submit by Sunday night - see labs page
- **APTs and APT Quizzes** : see APT page
- **Assignments**: See assignment page

Course Announcements

- January 10, 2023
  - First lecture is Thursday, January 12.

Every lecture:
DO NOT SIT IN THE LAST 5 FULL ROWS

or the small 2 seater row at the top!

About Prof Rodger

A long time ago, back in 1979….

NC State

B.S. Computer Science and Mathematics

- **My first semester, my first course in programming - PL/I**

```
Hello2: proc options(main);
     put list ('Hello, world!');
end Hello2;
```

Decisions? Industry? Grad School?

- **Systems Programmer**
  - NCSU,

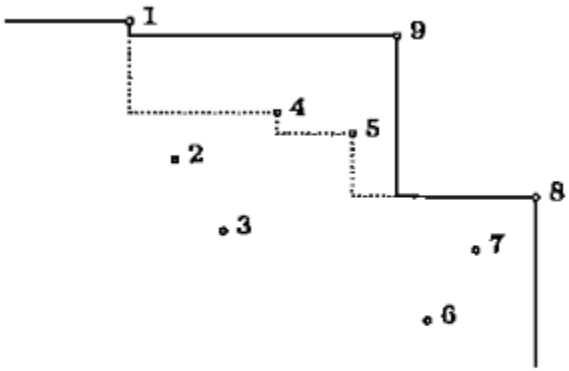
    University Systems Control Center
- **Undergraduate Research**
  - Cleanup data from buoys in the water

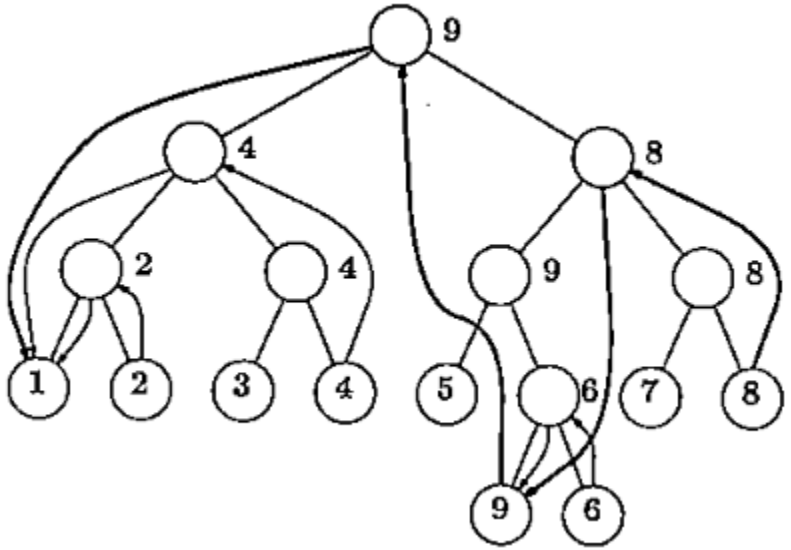
  - Last minute decision
    - IBM Summer job
    - Go to Grad School

- **MS. 1985, P.h.D 1989**

- **New Data Structure**

  Dynamic contour search tree





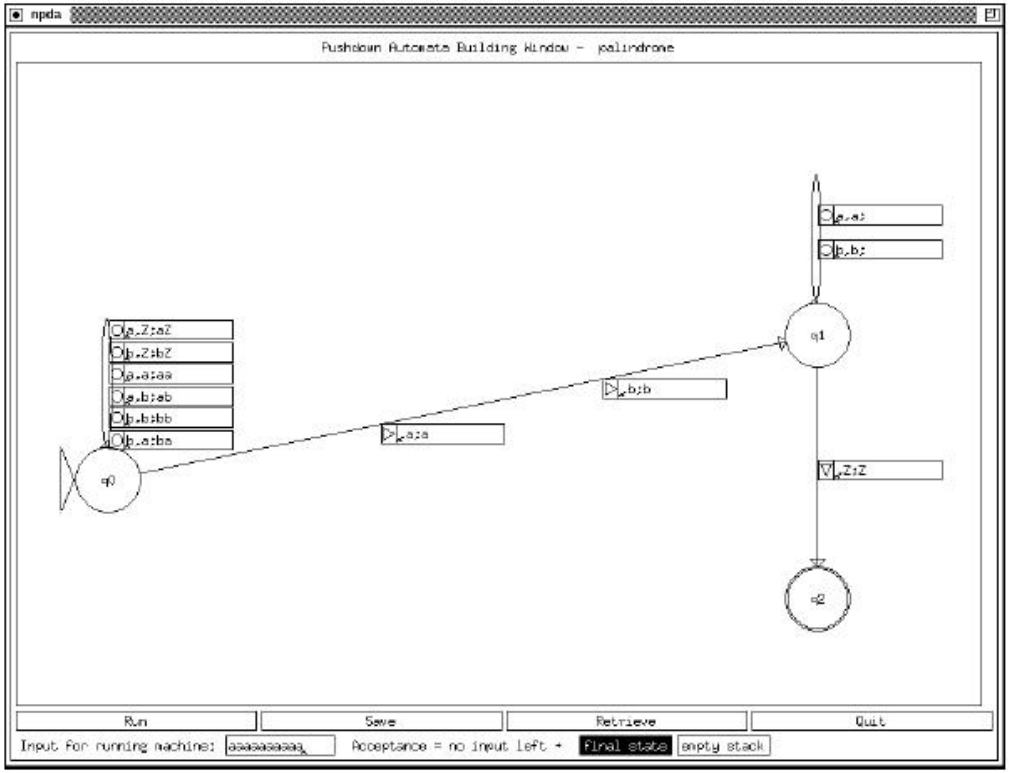
Rensselaer

Assistant Professor

- **Continued research in algorithms**
- **CAREER CHANGE….**
- **Got more interested in education**

Started developing education tools Changed area to Visualization Tools and CS Education

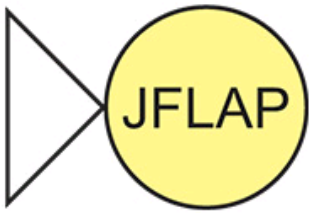
- **Tool – NPDA - to experiment with pushdown automata**



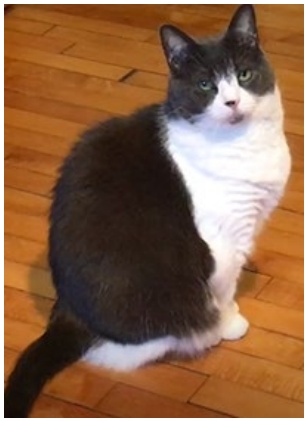
1994 – Moved to Duke University Professor of the Practice

- **Position focuses on Education in the Discipline**

- **Focused on designing educational software**
  - JFLAP – tool for experimenting with theoretical CS concepts



How I Keep my Sanity



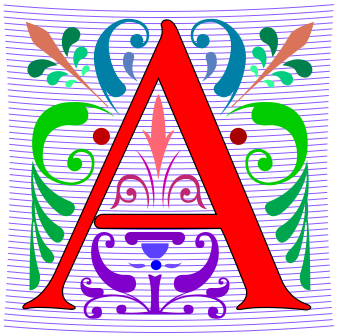
How do you keep your sanity?

Prof. Yesenia Velasco

- Handles logistics, substitute lectures, and much more!
- Will teach some lectures, teaching this course next semester
- Handles accommodations
  - Email her your accommodation letter
  - yvelasco@cs.duke.edu

Learn the CS Alphabet

A is for …



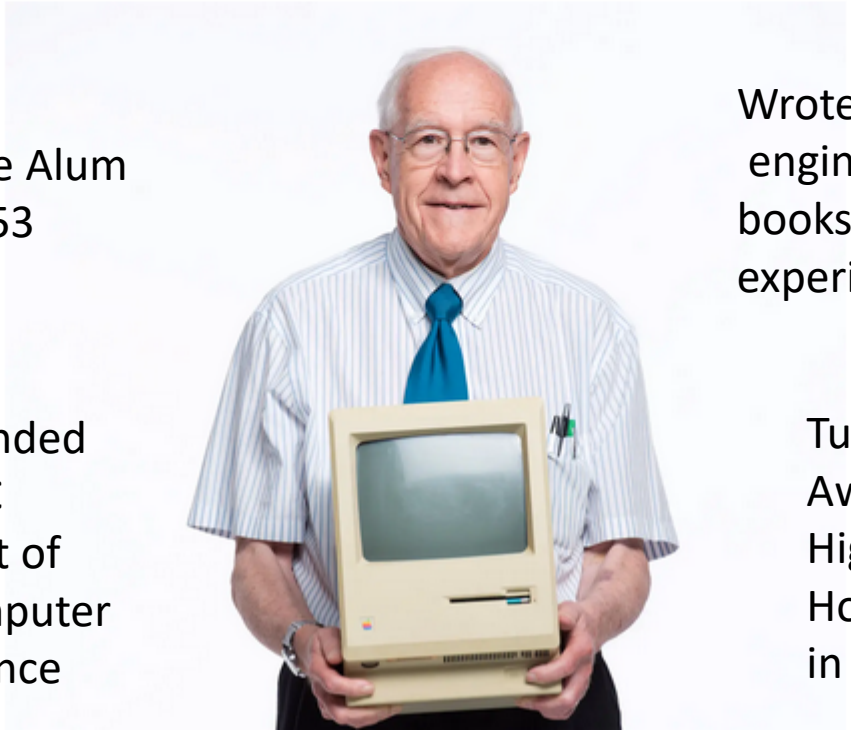
- **Algorithm**
  - Step-by-step instructions realized in a program
- **Abstraction**
  - Hiding things is powerful
  - “What” vs “How”
- **APT**
  - Algorithmic Problem-solving
    Testing
- **API**
  - Application Programming
    Interface - using Libraries

Feature someone related to CS in every lecture

The New York Times

Frederick P. Brooks Jr., Computer Design Innovator, Dies at 91

He was a lead designer of the computers that cemented IBM's dominance for decades. He later wrote a book on software engineering that became a quirky classic.

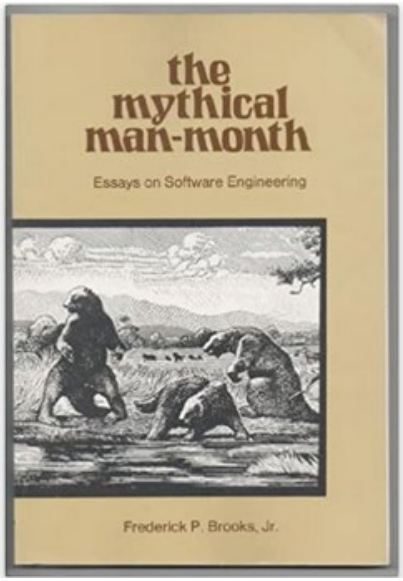


Duke Alum
BS '53

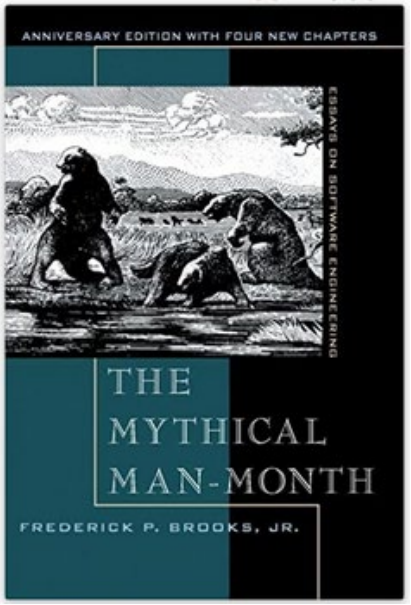
Founded
UNC
Dept of
Computer
Science

Wrote Software engineering books on his experience

Turing Award – Highest Honor in CS



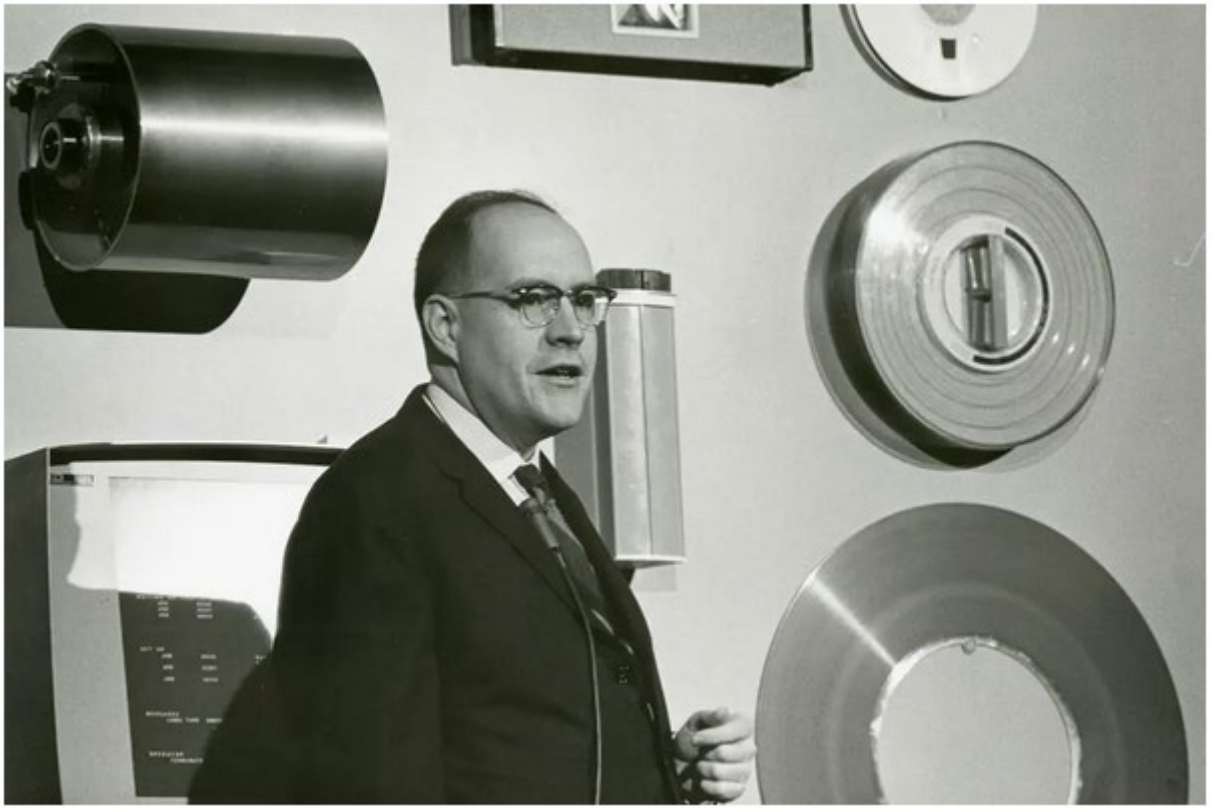
1975



1995

Brooks – Technical Leader of IBM's 360 computer project

- **1964 – 360 was a family of six compatible computers**



Duke Connection: Fred Brooks '53

- What Would FB Say?

"The most important single decision I ever made was to change the IBM 360 series from a 6-bit byte to an 8-bit byte, thereby enabling the use of lowercase letters. That change propagated everywhere."

Why is programming fun?

Fred Brooks

- **First is the sheer joy of making things**
- **Second is the pleasure of making things that are useful**
- **Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts**
- **Fourth is the joy of always learning**
- **Finally, there is the delight of working in such a tractable medium. The programmer, like the poet, works only slightly removed from pure thought-stuff.**

Go over CompSci 101 webpages

CompSci 101, Spring 2023
Home

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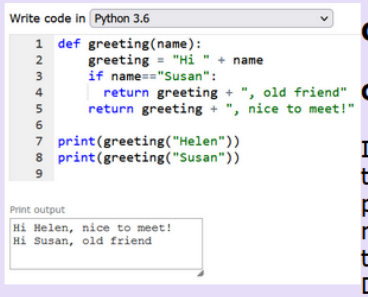

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Course Announcements

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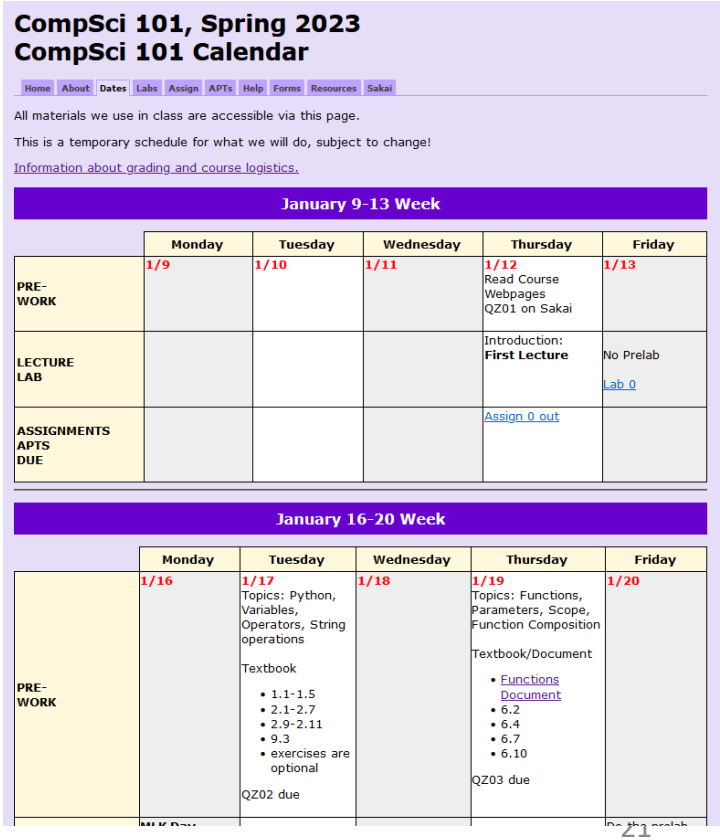
Announcements

- **Check out the calendar on the course website**
  - PRE-WORK – what you must do before the lecture
  - LECT/LAB – will put notes/videos here from the live lecture or for the lab
  - DUE – what is due each week.
  - What has been updated?
- **Assignment 0 is already out!**
- **Lab 0 on Friday**
- **Prelab for Lab1 (install Python)**
- **You will see a link to this video!**



CompSci 101, Spring 2023
CompSci 101 Calendar

Home | About | Dates | Labs | Assign | APTs | Help | Forms | Resources | Sakai

All materials we use in class are accessible via this page.

This is a temporary schedule for what we will do, subject to change!

Information about grading and course logistics.

January 9-13 Week

	Monday	Tuesday	Wednesday	Thursday	Friday
PRE-WORK	1/9	1/10	1/11	1/12 Read Course Webpages QZ01 on Sakai	1/13
LECTURE LAB				Introduction: **First Lecture**	No Prelab Lab 0
ASSIGNMENTS APTS DUE				Assign 0 out	

January 16-20 Week

	Monday	Tuesday	Wednesday	Thursday	Friday
PRE-WORK	1/16	1/17 Topics: Python, Variables, Operators, String operations Textbook • 1.1-1.5 • 2.1-2.7 • 2.9-2.11 • 9.3 • exercises are optional QZ02 due	1/18	1/19 Topics: Functions, Parameters, Scope, Function Composition Textbook/Document • Functions Document • 6.2 • 6.4 • 6.7 • 6.10 QZ03 due	1/20

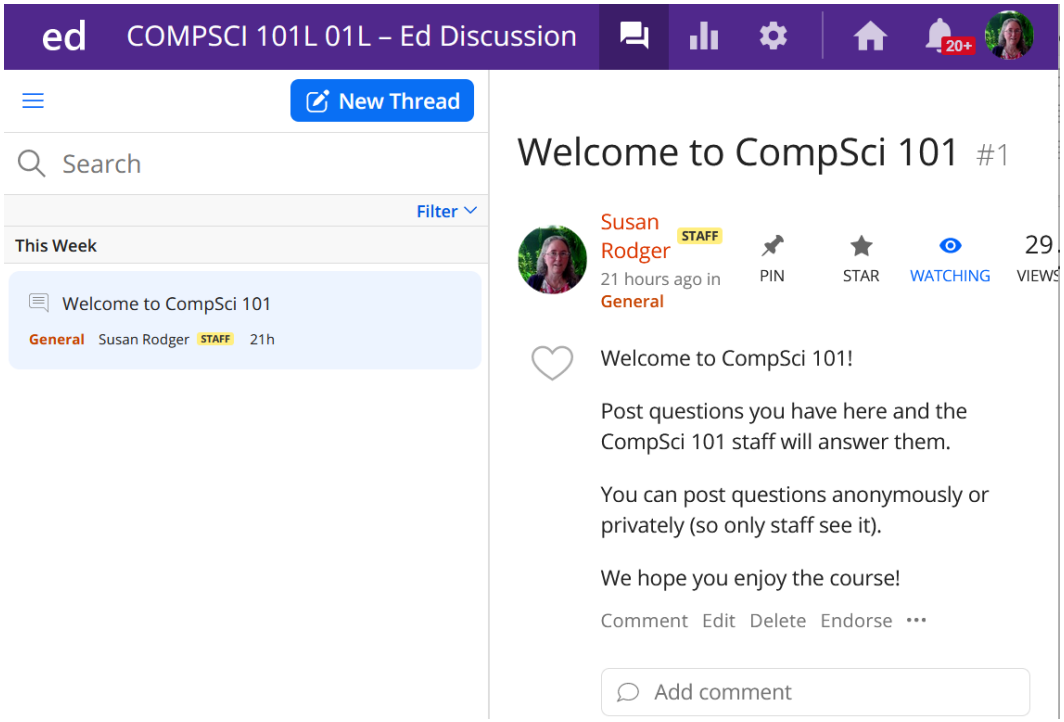
Course overview, logistics

www.cs.duke.edu/courses/spring23/compsci101

- **Programming assignments: APTs and Assignments**
  - Acknowledge assistance, to learn to program …
  - Be aware of late policy
- **Labs**
  - Attend each Friday
- **Lecture - Classwork**
  - Attend the live lecture - participate
  - If you can't attend you must watch it and participate within 24 hours
- **Exams: 3 exams and final**
  - All old exams available

Questions?

- **Don’t send us email!!!!!!!!!!**
- **Post your questions on Ed Discussion**
  - We will answer them there!
  - You should try to answer them too
    - Want to be a UTA one day? Answer questions!
- **Post Questions during lecture!**



What's in Compsci 101?

- **Learning about computing, computer science, and programming**
  - Vocabulary of Python and programming
  - *Power of automation, repetition, scale*
  - Understanding and changing the world
- **Programming using Python**
  - Tools: PyCharm, Libraries, …
  - Using mathematical and scientific techniques
  - Art *and* science of programming

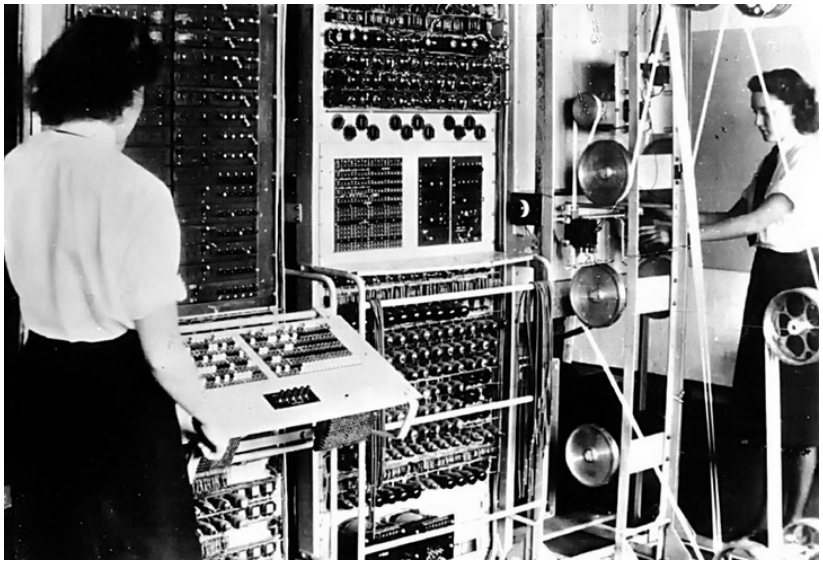
WOTO – Working Together

http://bit.ly/101s23-0112-1

Discuss with others, then everyone fills out their own form.

What is Computer Science?

How it started



How it’s going

Computers speak in 0's and 1's

1906

- **In old computers**
  - Control electric current using the vacuum
- **Nowadays, use switches**
  - A switch that is "on" or "closed" represents 1
    - Passes electrical current through
  - A switch that is "off" or "open" represents 0
    - Blocks electrical current
  - Express 0's and 1's, called bits
  - 8 bits are a byte and represent a symbol
- **What letter is 01000001 ?**

Computers speak in 0's and 1's

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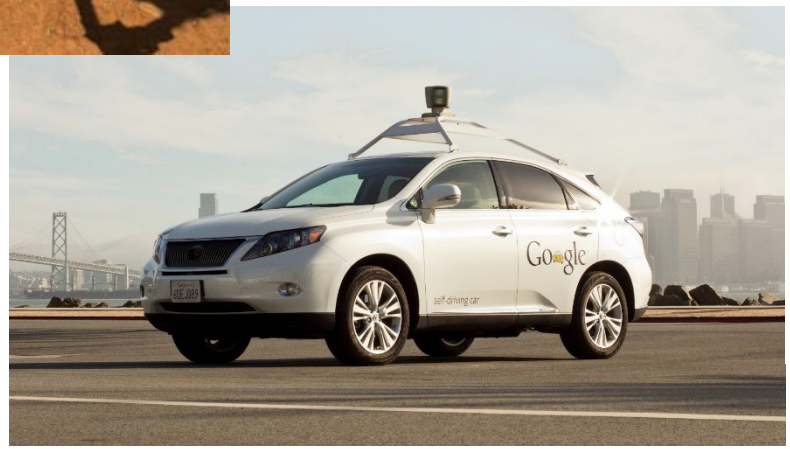
  - A switch that is "off" or "open" represents 0
    - Blocks electrical current
  - Express 0's and 1's, called bits
  - 8 bits are a byte and represent a symbol
- **What letter is 01000001 ?** A

What is Computer Science now?

- **Artificial Intelligence**

Roomba

Perseverence Mars Rover



Self-driving car

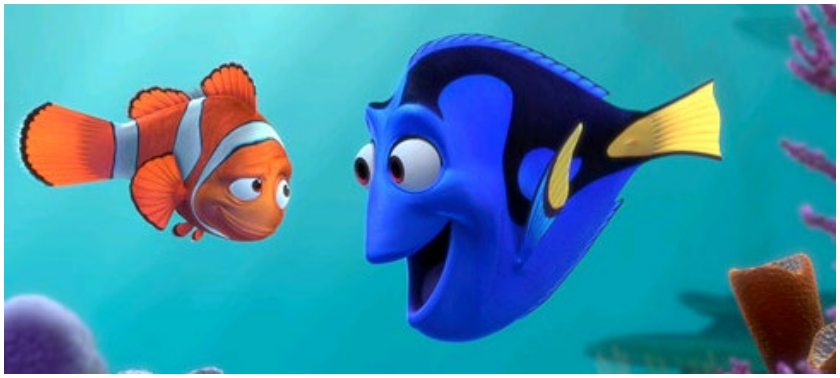
Personal Robot

What is Computer Science?

- **Medicine, Genomics**

What is Computer Science?

- **Animation**



What is Computer Science?

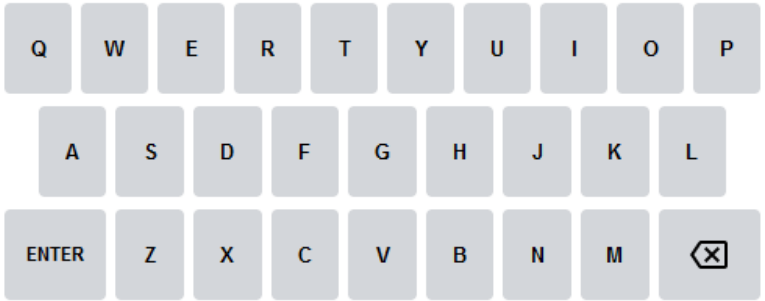
- **The Organization of Data, Sharing, and Searching**

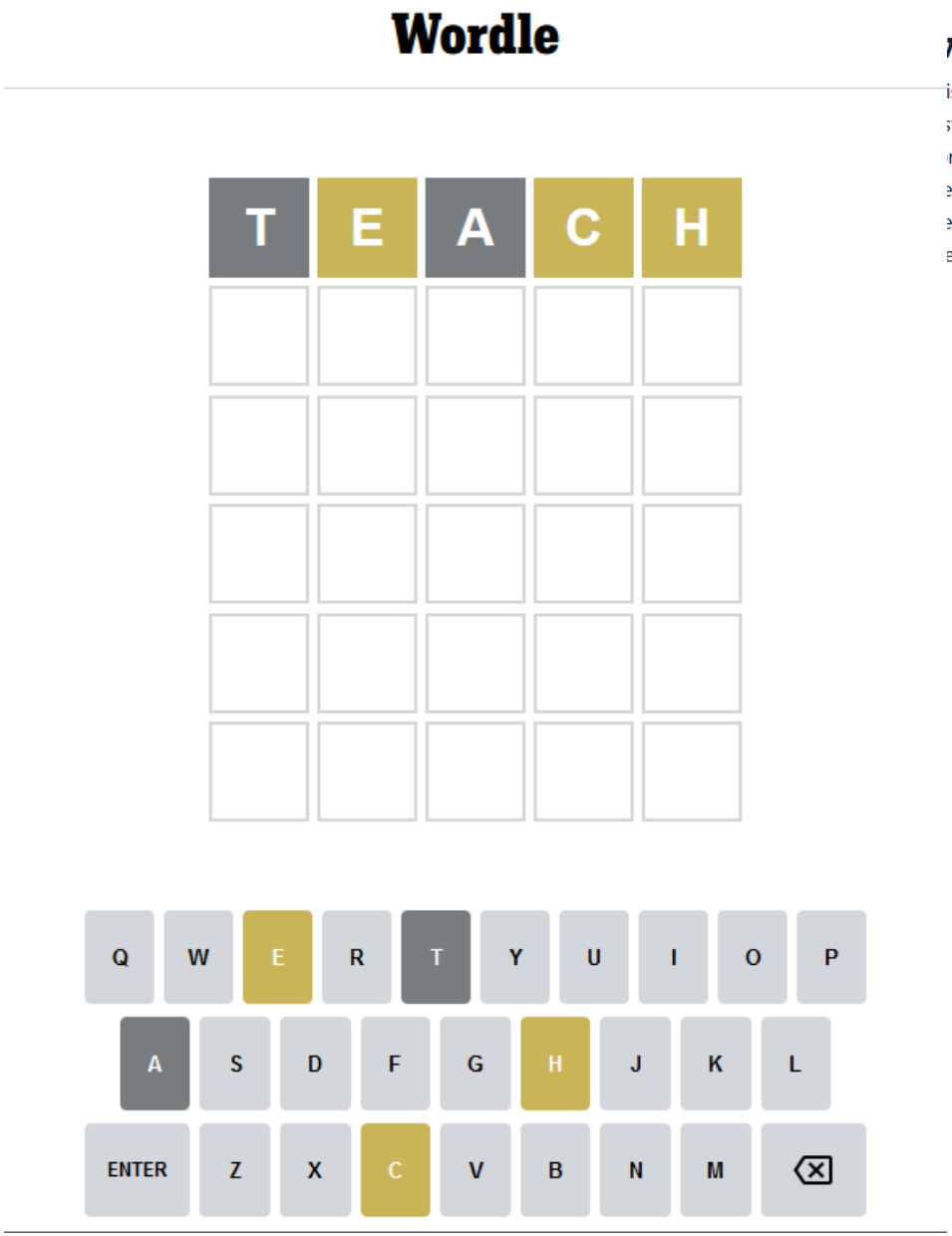
Prerequisites for Compsci 101

After taking this course you will be able to ….

- **Write a program for Wordle**
- **Write a word finder to help someone solve Wordle**

Wordle

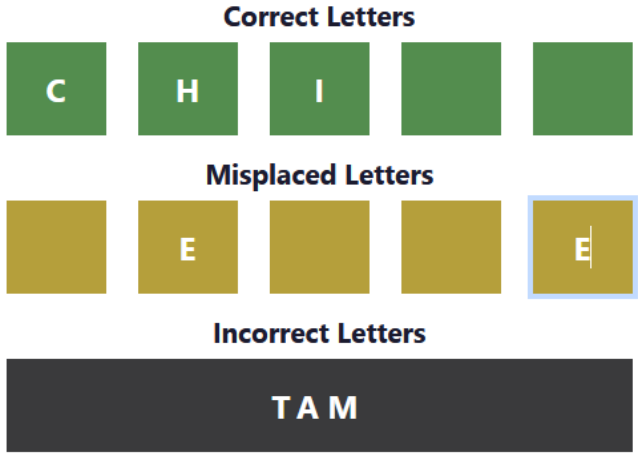



Wordle
T E A C H
Q W E R T Y U I O P
A S D F G H J K L
ENTER Z X C V B N M
Wordle Solver
is simple to use tool will help you solve any Wordle answer you are having trouble with.
t enter in the letters that you have gotten in the right spot into the same spot in the
rrect Letters section. Add any letters that are in the puzzle but not in the right spot to
Misplaced Letters area. Finally, enter anything you've guessed that isn't right at all into
Incorrect Letters section. The potential answers will populate as you enter in letters,
ntually giving you the solution!
Correct Letters
Misplaced Letters
E C H
Incorrect Letters
TA
Potential Answers (10)
cheek cheer chess chide chief chime choke
chore chose niche
Recommended Guesses
CHIDE CHIEF CHIME NICHE
Common Letters
E (12) C (10) H (10) I (4) S (3) O (3) K (2)
R (2) M (1) F (1)

Wordle

Wordle Solver

This simple to use tool will help you solve any Wordle answer you are having trouble with. Just enter in the letters that you have gotten in the right spot into the same spot in the Correct Letters section. Add any letters that are in the puzzle but not in the right spot to the Misplaced Letters area. Finally, enter anything you've guessed that isn't right at all into the Incorrect Letters section. The potential answers will populate as you enter in letters, eventually giving you the solution!



Potential Answers (1)

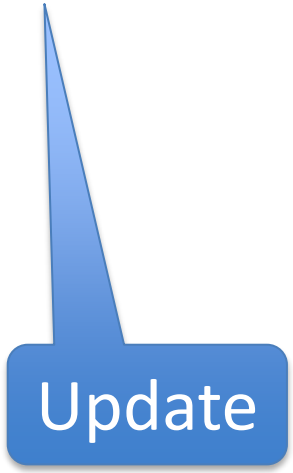
chief

Recommended Guess

CHIEF

Common Letters

C (1) **H** (1) **I** (1) **E** (1) **F** (1)



Wordle

T	E	A	C	H
C	H	I	M	E
C	H	I	E	F

Wordle Solver

This simple to use tool will help you solve any Wordle answer you are having trouble with. Just enter in the letters that you have gotten in the right spot into the same spot in the Correct Letters section. Add any letters that are in the puzzle but not in the right spot to the Misplaced Letters area. Finally, enter anything you've guessed that isn't right at all into the Incorrect Letters section. The potential answers will populate as you enter in letters, eventually giving you the solution!

Correct Letters

C H I

Misplaced Letters

E E

Incorrect Letters

T A M

Potential Answers (1)

chief

Recommended Guess

CHIEF

Common Letters

C (1) H (1) I (1) E (1) F (1)

Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	
ENTER	Z	X	C	V	B	N	M	⌫	

You will be able to write

You will be able to write

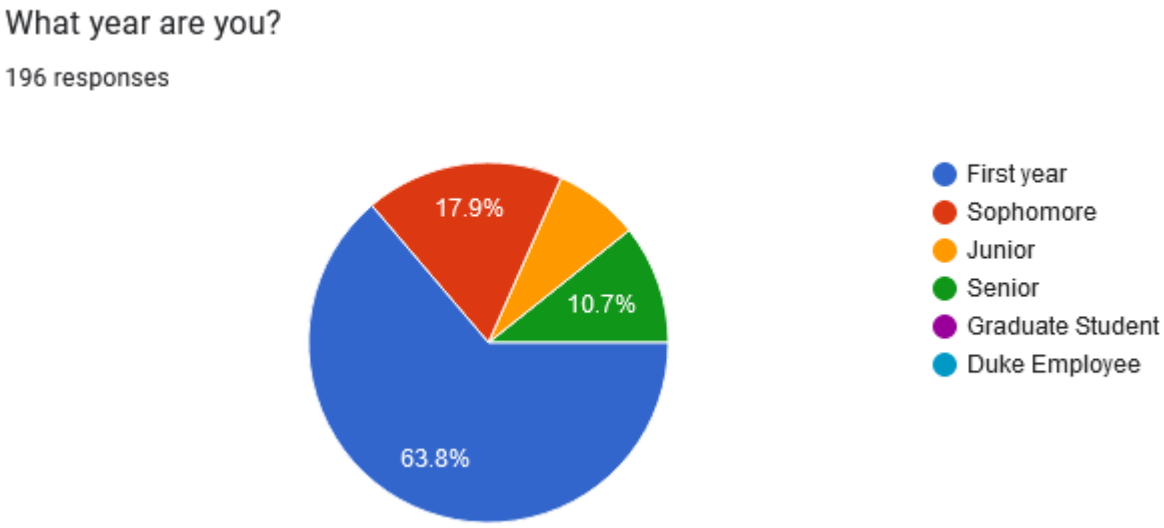
Who has taken CompSci 101?

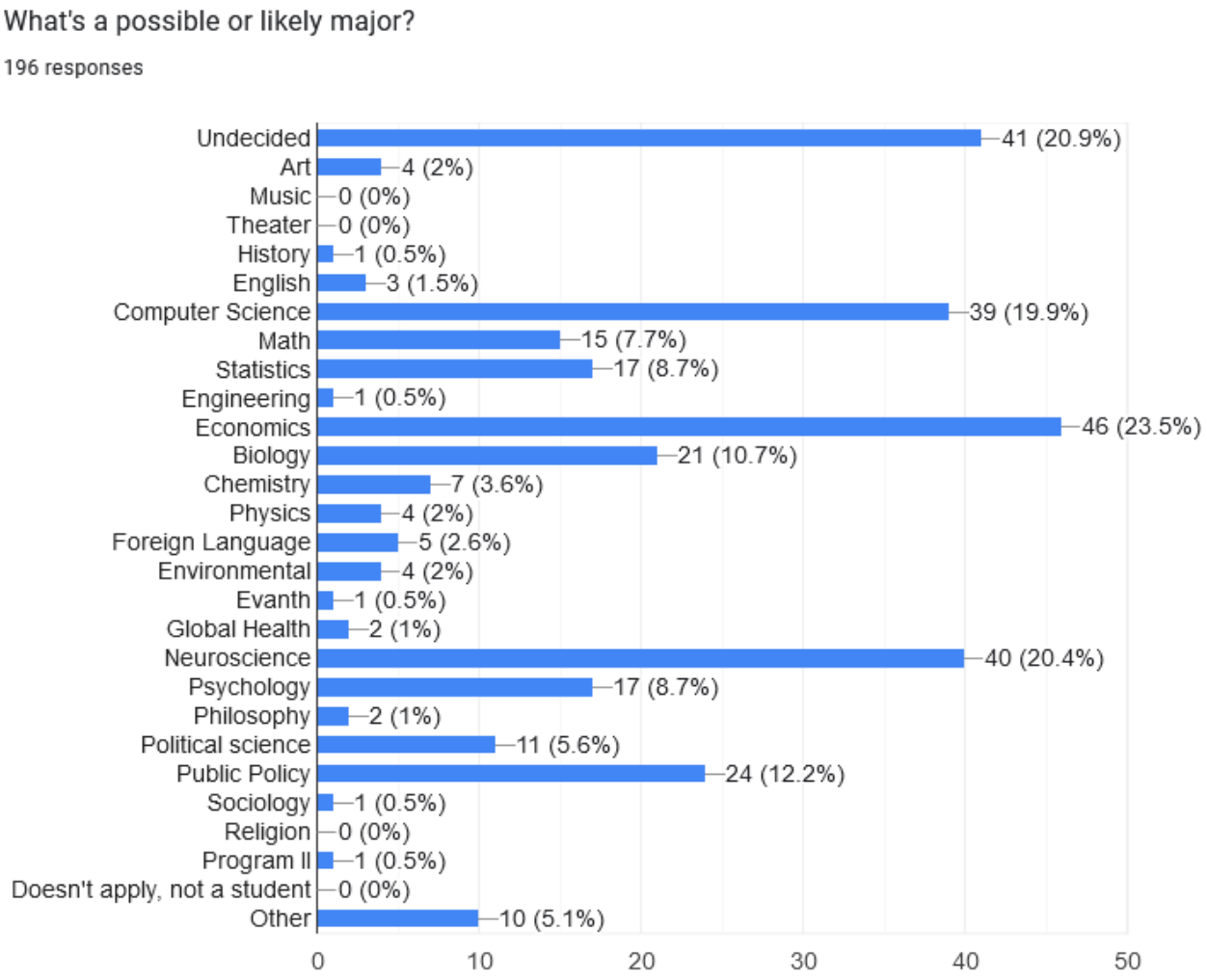
Who are you?

- **Let's look at survey to see who is taking Compsci 101 in Spring 2023**
  - Do you recognize yourself?
  - Is there a stereotypical Compsci 101 student?
  - Is there a stereotypical computer scientist?

- **Everyone can succeed! Ideally you won't have lots of experience programming**

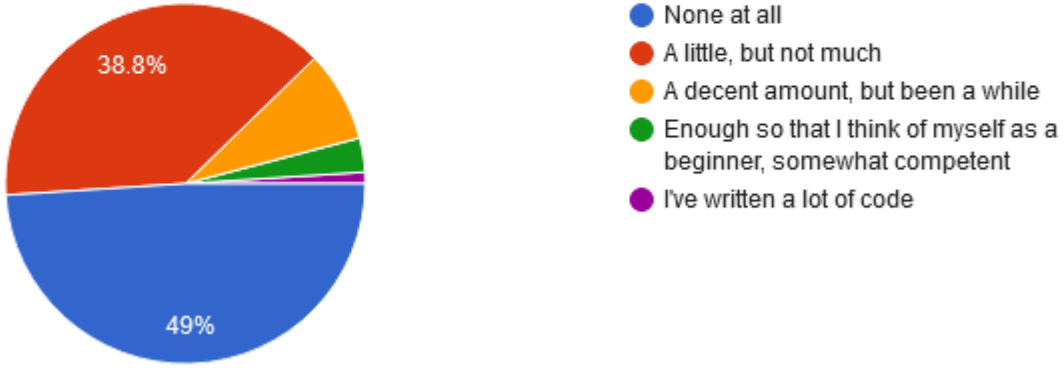
From Survey


What year are you?
196 responses
17.9%
10.7%
63.8%
First year
Sophomore
Junior
Senior
Graduate Student
Duke Employee


What's a possible or likely major?
196 responses
Undecided
Art
Music
Theater
History
English
Computer Science
Math
Statistics
Engineering
Economics
Biology
Chemistry
Physics
Foreign Language
Environmental
Evanth
Global Health
Neuroscience
Psychology
Philosophy
Political science
Public Policy
Sociology
Religion
Program II
Doesn't apply, not a student
Other
41 (20.9%)
4 (2%)
0 (0%)
0 (0%)
1 (0.5%)
3 (1.5%)
39 (19.9%)
15 (7.7%)
17 (8.7%)
1 (0.5%)
46 (23.5%)
21 (10.7%)
7 (3.6%)
4 (2%)
5 (2.6%)
4 (2%)
1 (0.5%)
2 (1%)
40 (20.4%)
17 (8.7%)
2 (1%)
11 (5.6%)
24 (12.2%)
1 (0.5%)
0 (0%)
1 (0.5%)
0 (0%)
10 (5.1%)
0
10
20
30
40
50

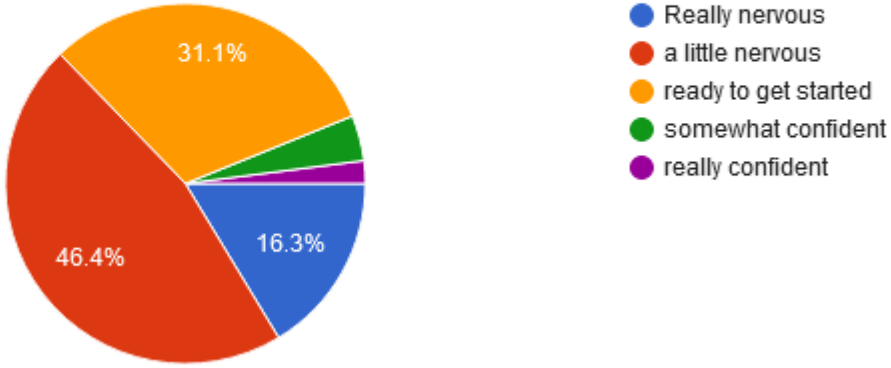
How much programming have you done before?

196 responses

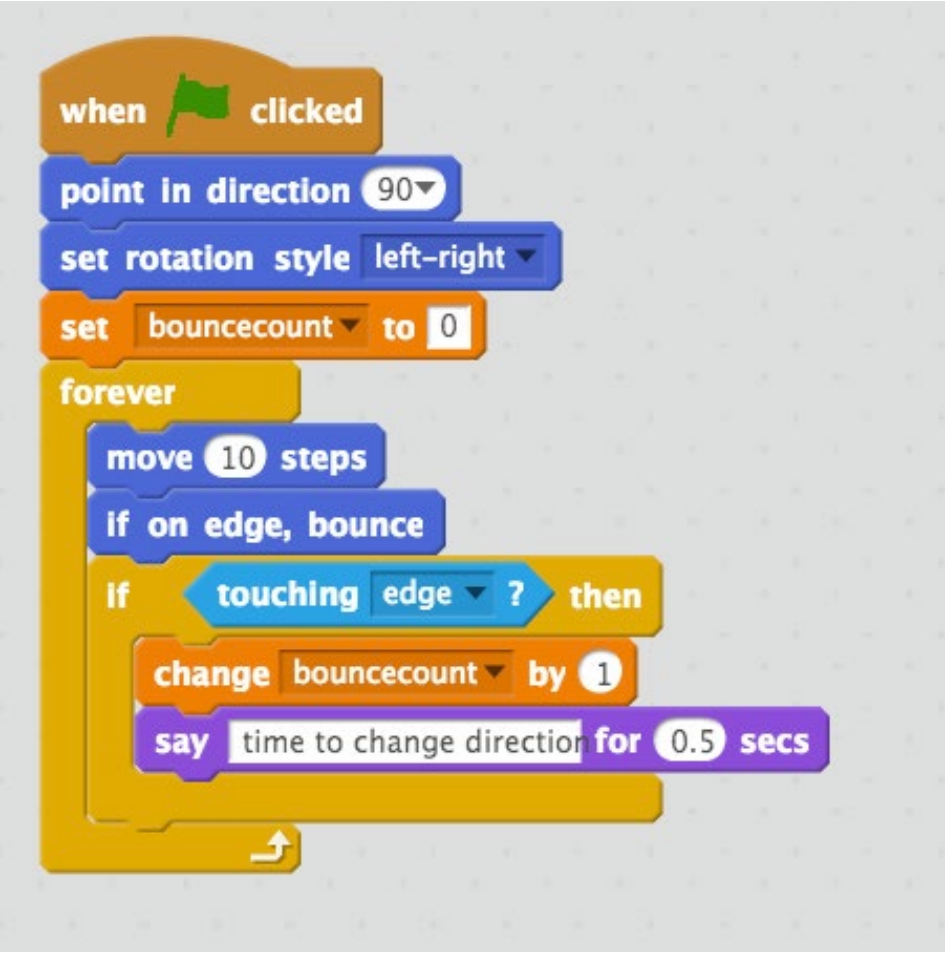


How do you feel about taking CompSci 101?

196 responses



What does this program do?



- "Hello World"
- Scratch Program
- Colors
  - Duke blue: motion
  - Mustard: control
  - Light blue: sensing
  - Orange: data
  - Purple: looks

WOTO: WOrking TOgether

http://bit.ly/101s23-0112-2

Analyze this

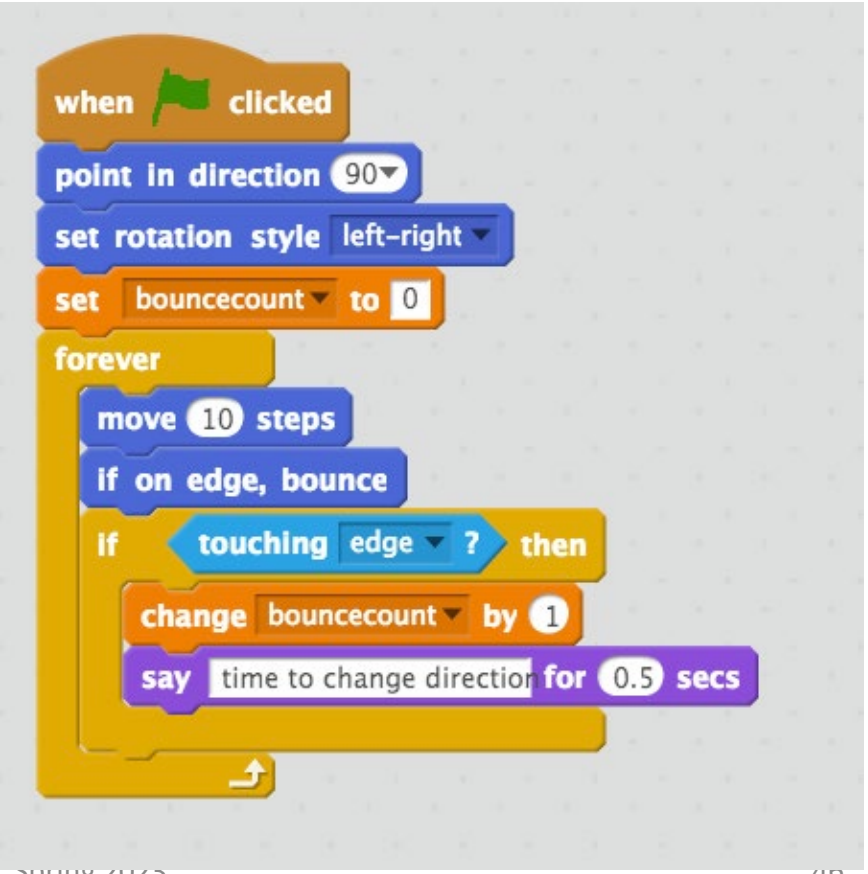
Scratch Program?

WOTO: WOrking TOgether

http://bit.ly/101s23-0112-2

Analyze this

Scratch Program?



Scratch Program

- **If you want to experiment with this scratch program, here is the link:**

https://scratch.mit.edu/projects/94064630/

You don't have to understand this yet!!

What language will we learn?

- http://www.python.org/
- Python is a *multi-paradigm* language
  - Procedural
  - Functional
  - Object-Oriented
- Simple, libraries, widely used
- Guido von Rossom

Why is it called Python?

A

B

Why is it called Python?

A

B

Python code
hello.py

```
1   """
2   Created on 1/6/2022
3
4   @author: Susan H. Rodger
5   """
6
7   if __name__ == '__main__':
8       print("Hello CompSci 101!")
```

OUTPUT:

Python code hello.py

```
1   """
2   Created on 1/6/2022
3
4   @author: Susan H. Rodger
5   """
6
7   if __name__ == '__main__':
8       print("Hello CompSci 101!")
```

You don't have to understand this yet!!

OUTPUT:

```
C:\Users\Susan\AppData\Local\Progr
Hello CompSci 101!

Process finished with exit code 0
```

Python Code, second program

```
6   def greeting(name):
7       print("Hello " + name)
8
9   if __name__ == '__main__':
10      greeting("CompSci 101!")
11      greeting("Beenie, Keeah and Moe")
```

OUTPUT:

Python Code, second program

```
6   def greeting(name):
7       print("Hello " + name)
8
9   if __name__ == '__main__':
10      greeting("CompSci 101!")
11      greeting("Beenie, Keeah and Moe")
```

You don't have to understand this yet!!

OUTPUT:

```
C:\Users\Susan\AppData\Local\P
Hello CompSci 101
Hello Beenie, Keeah and Moe
```