Freshman Advising:
The Computer Science Major at Yale

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What is Computer Science?

❑ Late ~~lonely~~ nights in front of computers?
❑ Computers?
❑ A field looks at fundamental questions such as

   ❍ "What is an efficient technique/algorithm for solving this class of problems computationally?"

   ❍ "How can we organize a system to achieve extensibility, reliability?"

   ❍ "How can we structure this interface to be most intelligible to users?"
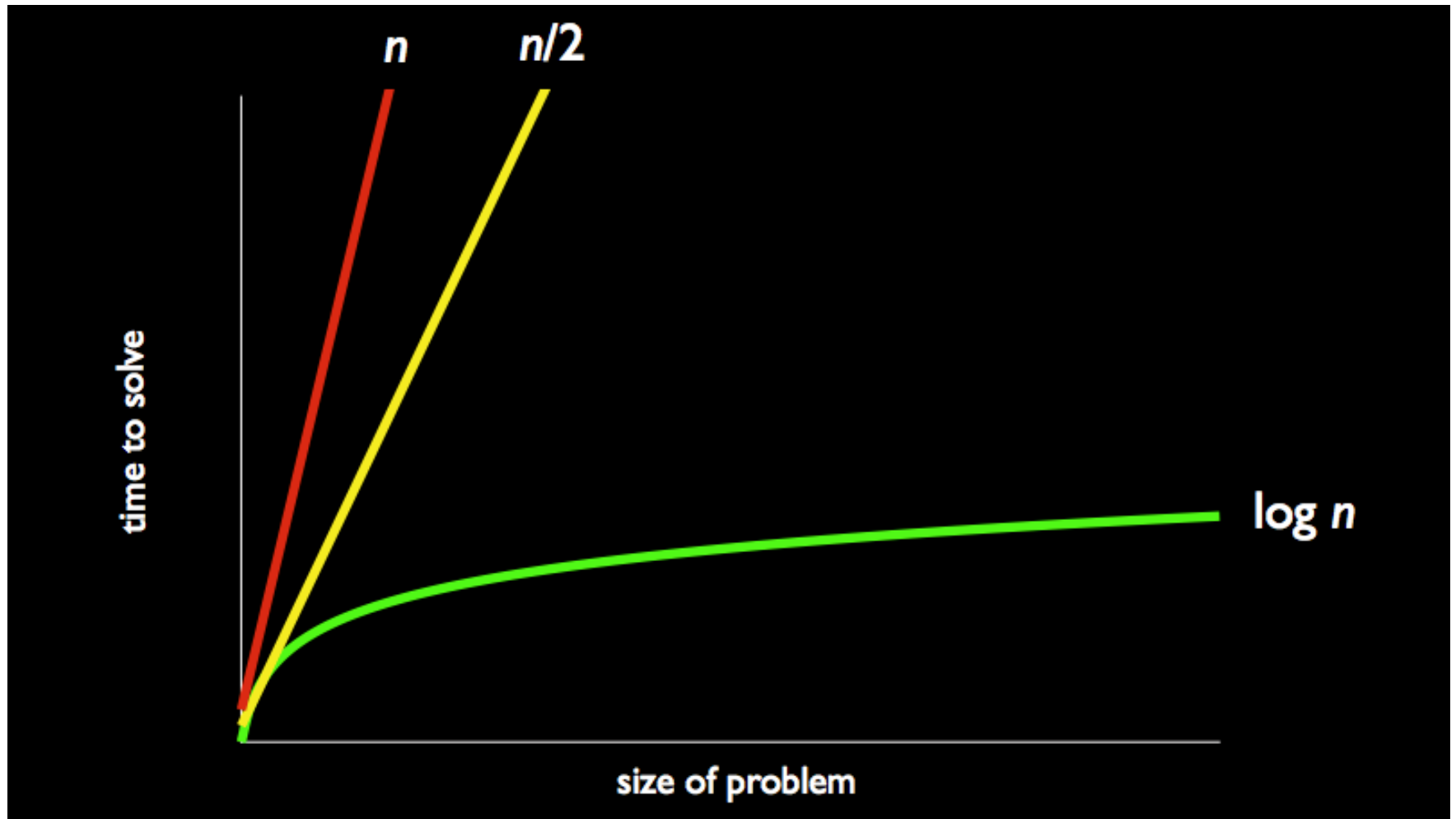
Example: Algorithmic Thinking

- **al·go·rithm:**
  a step-by-step procedure for solving a problem or accomplishing some end, *especially by computers.*

- Problem: How to look up a name in the telephone directory?
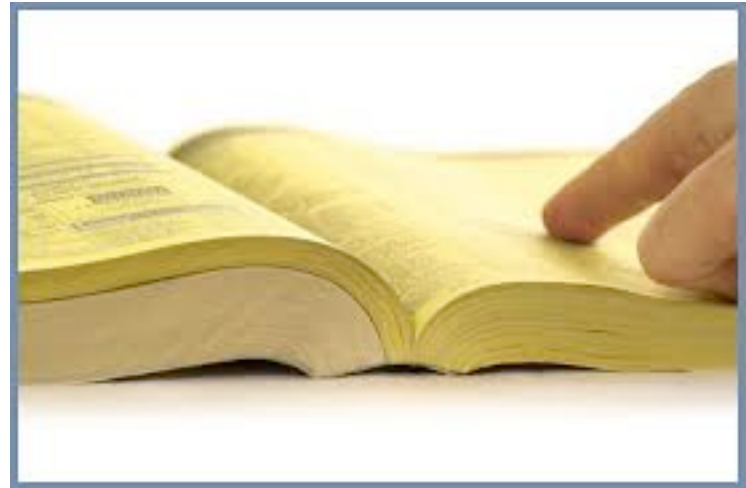
Comparison of Complexity

Algorithm Example: Counting

❑ Problem: How to count the number of students in a classroom?

Src: http://www.flickr.com/photos/usag-yongsan/5587562543/

Google's Map-Reduce Scheme

❑ Initialize all inputs

❑ Repeat until no input to process
  ○ Map: partition inputs into buckets
  ○ Reduce: process the inputs in the same bucket

A Map-Reduce Counting Algorithm

❑ Initialize inputs
  ○ every student finds a piece of paper, writes 1 on it, and stands up
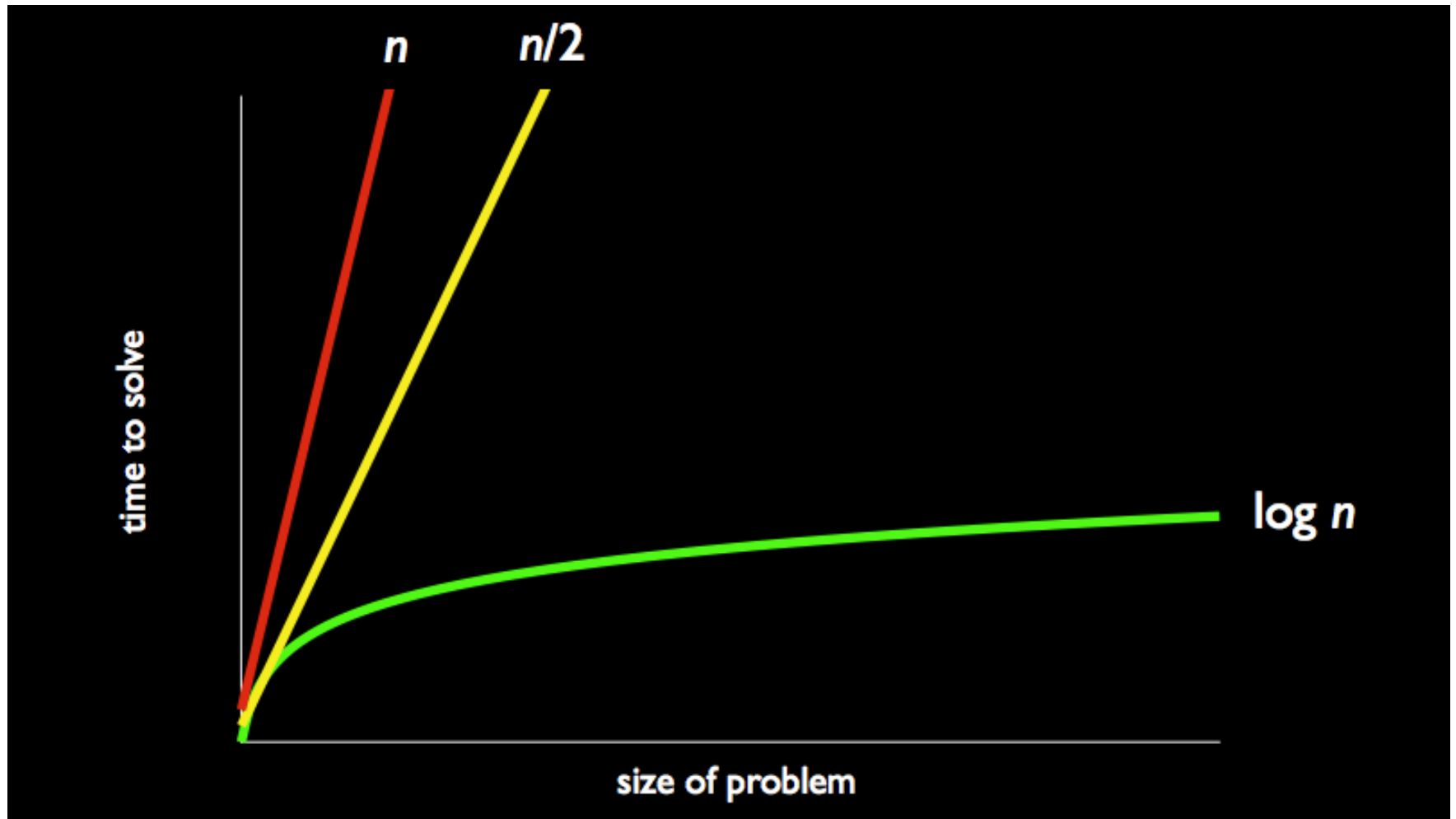
❑ Repeat
  ○ Map:
    • Pairing standing-up students
  ○ Reduce:
    • For each pair, one student gives his/her number to the other and sits down; The other student updates its number to be the sum and remains standing up

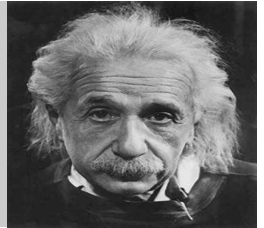Q: How long does the alg run?

Comparison of Complexity

Why CS?

" Computers are incredibly fast, accurate, and stupid; humans are incredibly slow, inaccurate, and brilliant; together they are powerful beyond imagination. " — *Albert Einstein*

The CS Major – A Flexible Major

Degrees offered
- ○ BS: Designed for students who plan to continue in computing after graduation, including technical management and consulting
- ○ BA: Preparation for work in other fields such as finance, law, management, or medicine
- ○ Multiple combined Majors:
  - • Computer Science and Mathematics
  - • Computer Science and Psychology
  - • Electrical Engineering and Computer Science
  - • Computing and the Arts
- ○ BS+MS: Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the Bachelor of Science and Master of Science degrees after eight terms of enrollment

The CS Major – A Flexible Major

Course requirements

- 12 courses total for BS, 10 for BA

  - 6 core courses (including Senior Project)

  - Wide range of electives

  - Room to take courses in other departments (non-CS electives)

Courses and Research

❑ Core courses concentrate on fundamentals like programming and theory

❑ Elective courses branch out into many areas of Computer Science:

Algorithms	Databases	Artificial Intelligence
Cryptography	Distributed Systems	Computer Graphics
Computational Complexity	Mobile Computing and Networking	Computer Vision
Computing and Economics	Operating Systems	Machine Learning
Scientific computing	Programming Languages	Natural language processing
Security	Software Verification	Robotics

Active Research in all of the above areas

Most advanced undergraduate courses are the same as graduate courses. So seniors often study alongside grad students in such courses.

The CS Major: Requirements

	Computer Science	
Degrees Offered	BA Computer Science	BS Computer Science
Prerequisites for entering the major	None	None
Requirements for each degree	10 term courses	12 term courses
	CPSC 201	
	CPSC 202 or MATH 244	
	CPSC 223, 323, and 365 (or 366)	
	4 intermediate or advanced CPSC courses	6 intermediate or advanced CPSC courses
Senior Requirements	Senior Project (CPSC 490)	
Substitutions	Advanced courses in other departments with DUS permission	

CS Major Path - BA

CPSC BA

	Fall	Spring
Year 1	CPSC 201	CPSC 223
Year 2	CPSC 202 (or MATH 244) & CPSC 323	CPSC 365 (or 366) & One Elective
Year 3	One Elective	One Elective
Year 4	CPSC 490	One Elective

CPSC BA Soph Start

	Fall	Spring
Year 1		
Year 2	CPSC 201	CPSC 202 (or MATH 244) & CPSC 223
Year 3	CPSC 323 & One Elective	CPSC 365 (or 366) & One Elective
Year 4	CPSC 490 & One Elective	One Elective

CS Major Path - BS

CPSC BS

	Fall	Spring
Year 1	CPSC 201	CPSC 223
Year 2	CPSC 202 (or MATH 244) & CPSC 323	CPSC 365 (or 366) & One Elective
Year 3	Two Electives	Two Electives
Year 4	CPSC 490	One Elective

CPSC BS Soph Start

	Fall	Spring
Year 1		
Year 2	CPSC 201	CPSC 202 (or MATH 244) & CPSC 223
Year 3	CPSC 323 & One Elective	CPSC 365 (or 366) & One Elective
Year 4	CPSC 490 & Two Electives	Two Electives

"The Unoffical Guide to CS@Yale"

The Unofficial Guide to CS at Yale
Version 2

→ Prerequisite
— May be taken in any order
--→ Talk with the Director of Undergraduate Studies

Designed Primarily for Non-Majors

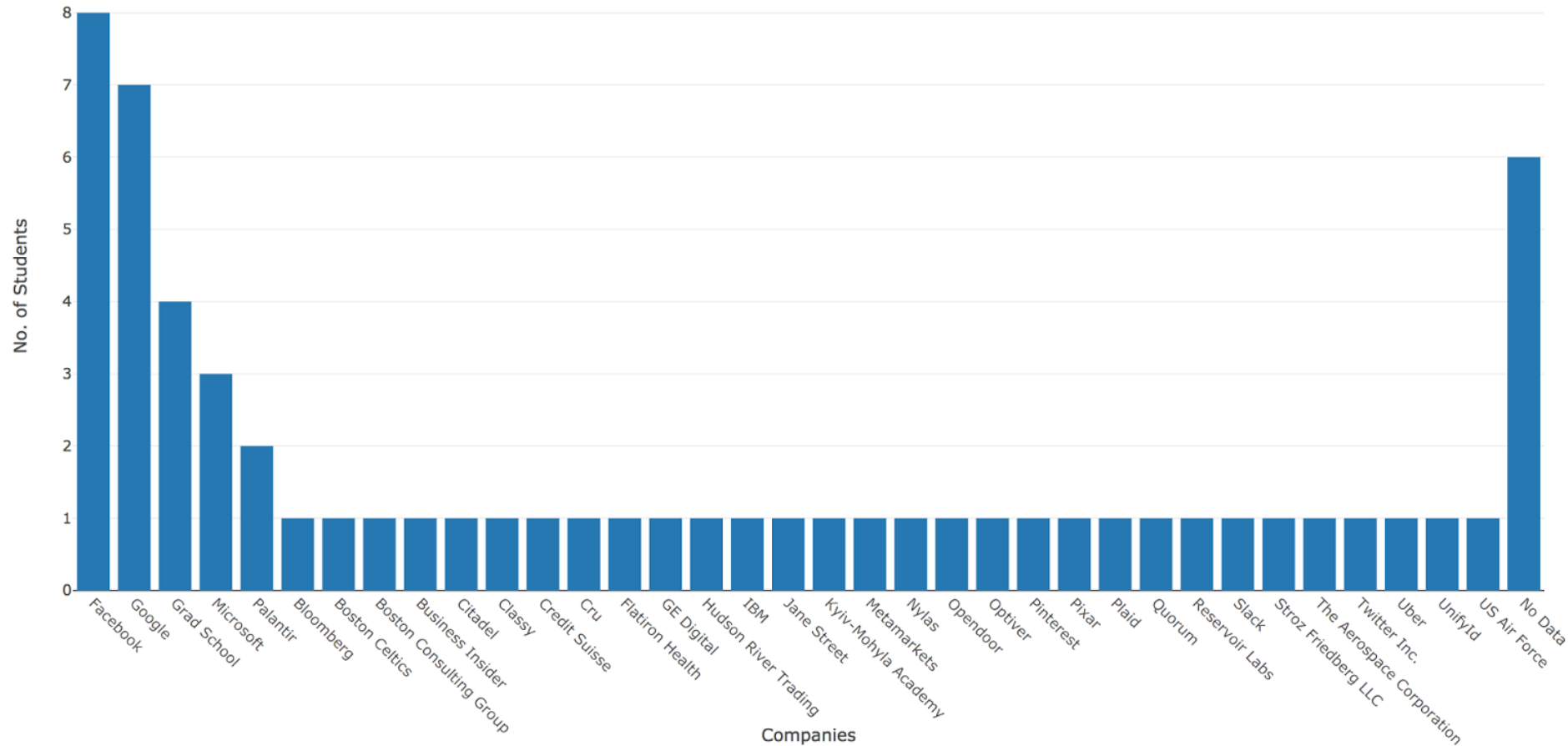Designed Primarily for Majors

https://cdn.cs50.net/guide/yale-2.pdf
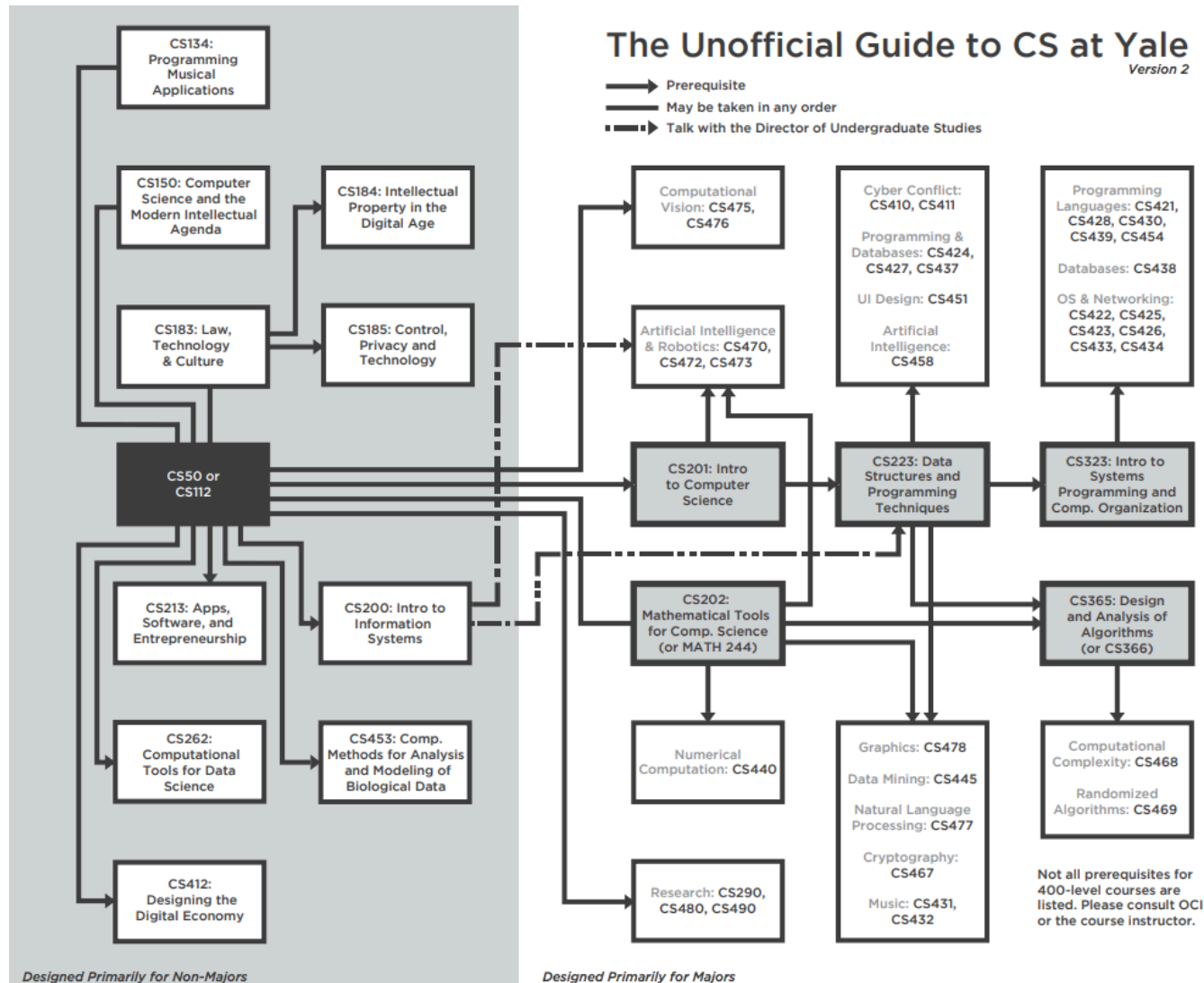
Where Do Computer Science Majors Go?
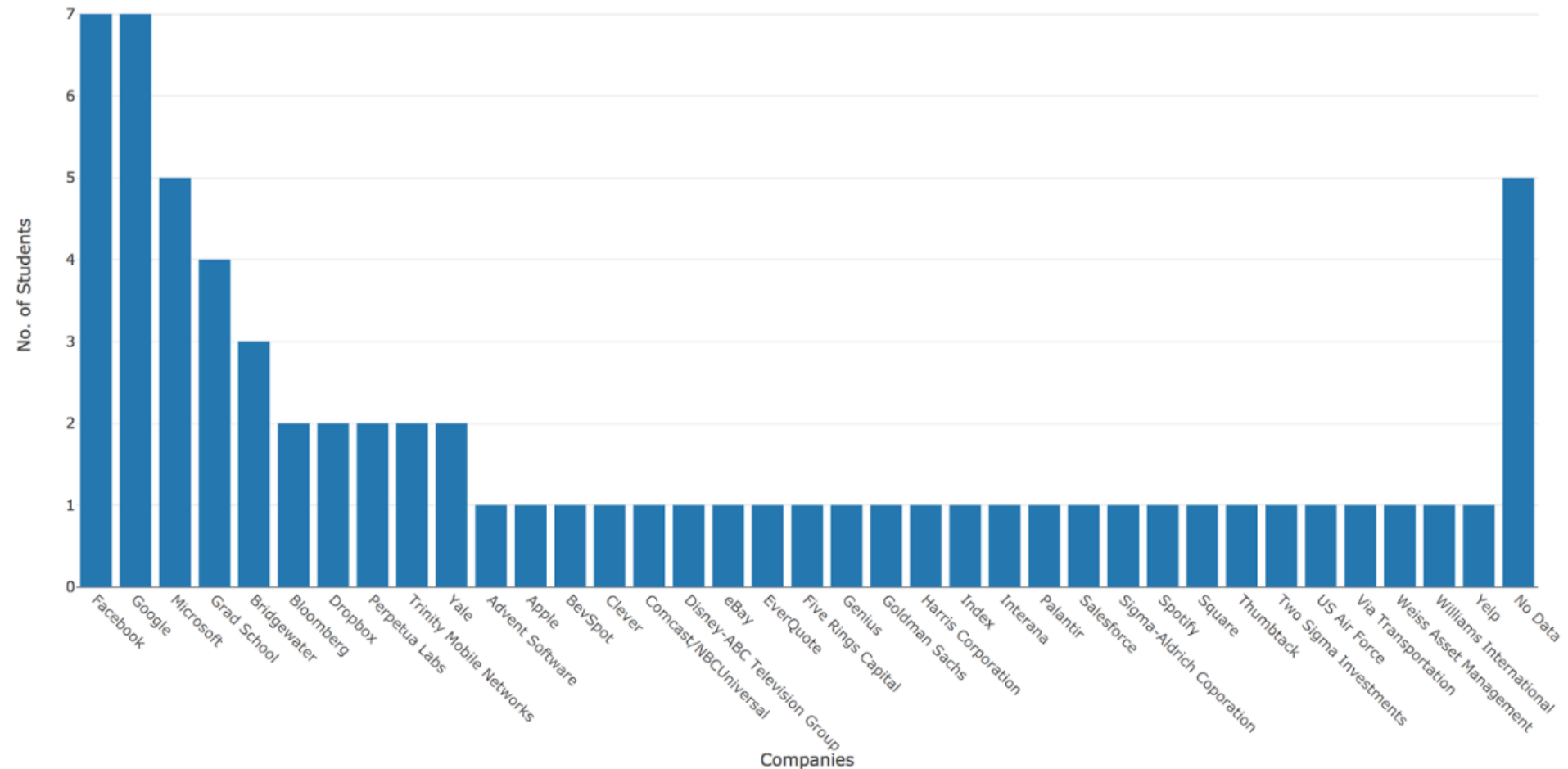
- ❏ Tech companies: Google, Microsoft, Facebook, Oracle, Dropbox, …
- ❏ Consulting: McKinsey, BCG, Accenture, …
- ❏ Investment banks: Goldman Sachs, JP Morgan, …
- ❏ Startups: Twitch.tv, …
- ❏ Grad school: too many to list

Where Do CS Majors Work (class of 2017)?

Class of 2017 CS Majors Employment

https://medium.com/@johnamadeo/where-do-yale-cs-majors-work-3396510b3f56

Where Do CS Majors Work (class of 2016)?

https://medium.com/@johnamadeo/where-do-yale-cs-majors-work-3396510b3f56

Where Do CS Majors Work (class of 2014)?

Class of 2014 CS Majors Employment

https://medium.com/@johnamadeo/where-do-yale-cs-majors-work-3396510b3f56
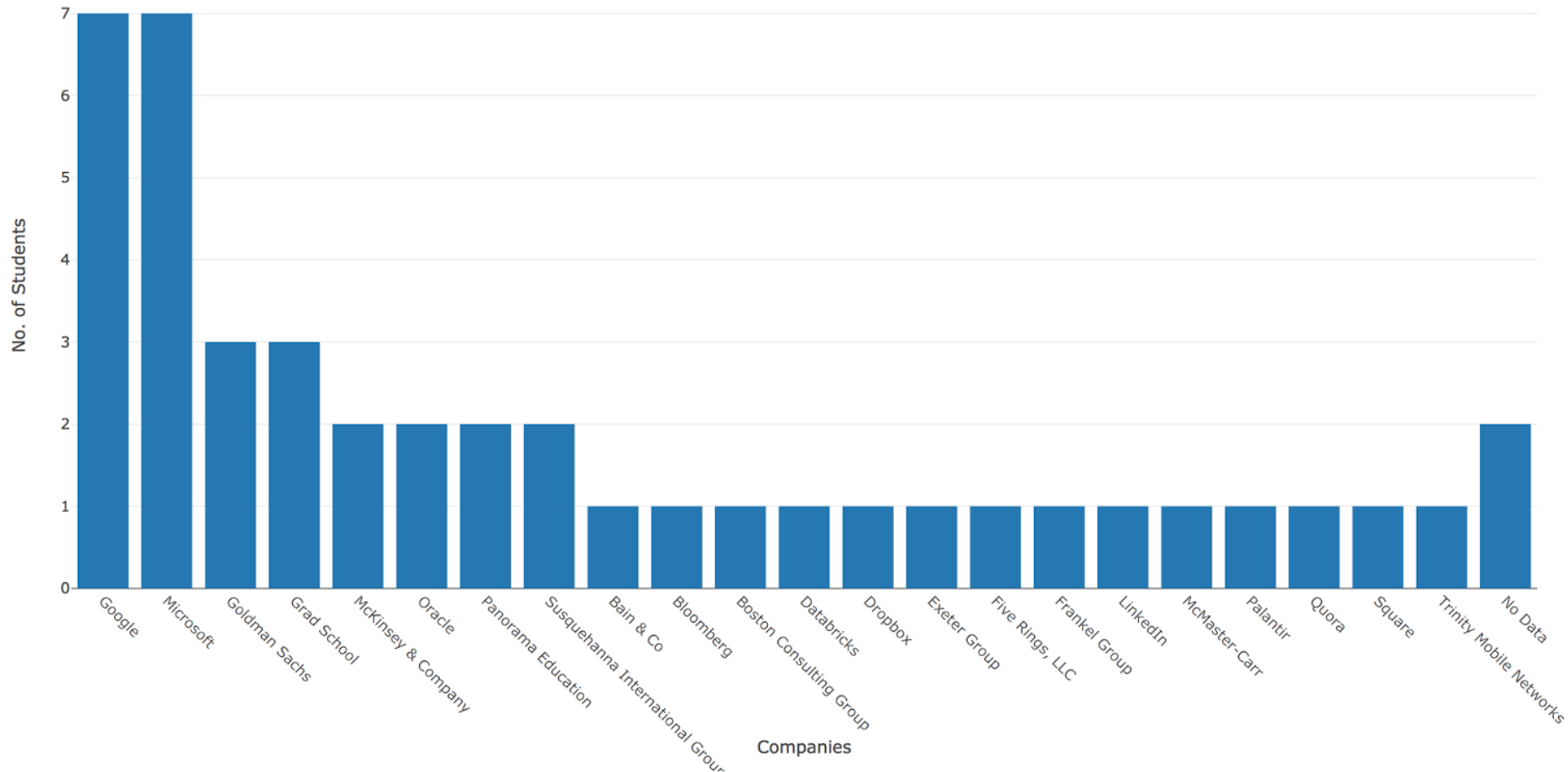
CS Undergrads and CS Professors

❑ About 25 Professors from the Top 50 CS departments in the nation received their undergrad degrees at Yale,
compared to

  ○ 32 at Stanford,

  ○ 31 at Carnegie Mellon,

  ○ 21 at the University of Michigan and

  ○ 20 at Georgia Tech,
    despite having Yale CS annual CS cohort is at least 50% smaller than any of these universities.

Source: http://cs.brown.edu/people/apapouts/faculty_dataset.html

Advices from Majors (2011, 2012, 2013)

- http://dus.cs.yale.edu/Advice/2011.html
- http://dus.cs.yale.edu/Advice/2012.html
- http://dus.cs.yale.edu/Advice/2013.html

CS Student Life

❑ Arthur K. Watson (AKW) building
  ○ Home of the CS department
  ○ Majority of your CS classes will be held here

❑ The Zoo
  ○ Our educational computing facility
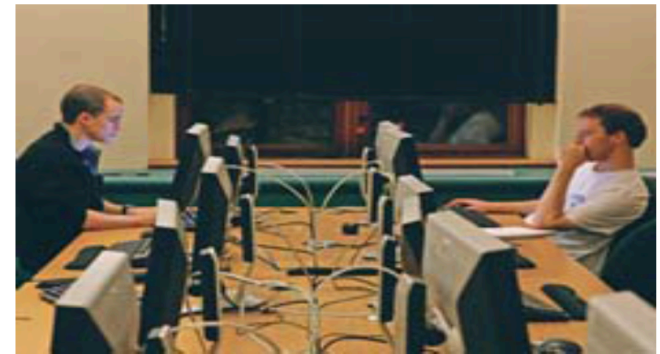
CS Student Life (Favorite Restaurants from CS112)

Chipotle	13	Chipotle	8
Barcelona	8	Miya's Sushi	6
Sushi on Chapel	5	BAR Pizza	5
Basil	4	Basil	4
Shake Shack	4	Prime 16	4
Zinc	4	Sushi on Chapel	4
Basta Trattoria	3	Barcelona	3
Chick-Fil-A	3	Cheesecake Factory	3
Olive Garden	3	In-N-Out Burger	3
Prime 16	3	Maggiano's	3
Thai Taste	3	Outback Steakhouse	3
Aladdin's	2	Thai Taste	3
Caseus	2	Buffalo Wild Wings	2
Charleston's	2	Caseus	2
Max Brenner	2	Five Guys	2
Morton's	2	Fogo de Chao	2
Panahar	2	Ivy Noodle	2
Panera Bread	2	Kumo Sushi	2
Portillos	2	Olive Garden	2
Taste of China	2	Pepe's Pizza	2

CS Student Life (Favorite Books from CS112)

Ender's Game	7	Harry Potter	7	Harry Potter	5
Harry Potter	6	Catcher in the Rye	6	The Count of Monte Cristo	4
Gone with the Wind	4	The Lord of the Rings	5	The Little Prince	
The Hitchhiker's Guide to th	4	Pride and Prejudice	4	Ender's Game	3
Pride and Prejudice	4	1984	3	1984	
The Book Thief	3	A Tree Grows In Brooklyn	3	The Fountainhead	
The Catcher in the Rye	3	East of Eden	3	100 Years of Solitude	
The Great Gatsby	3	The Great Gatsby	3	On the Road	
Blink	2	Wuthering Heights	3	Kafka on the Shore	2
Catch-22	2	A Civil Action	2	East of Eden	
East of Eden	2	A Tale of Two Cities	2	Catch -22	
Mrs Dalloway	2	Building Java Programs: A Back to	2	Invisible Man	
Outliers	2	Cat's Cradle	2	Sarlet Pimpernel	
Slaughterhouse-Five	2	Catch-22	2	The Great Gatsby 1	
The Giver	2	Ender's Game	2	A Clockwork Orange 1	
The Kite Runner	2	Great Expectations	2	A Wrinkle in Time 1	
The Boys in The Boat	2	Jane Eyre	2	Lolita 1	
To Kill a Mockingbird	2	Life of Pi	2	Notes from Underground 1	
Wuthering Heights	2	Norwegian Wood	2	Bible 1	

Should you be a CS major?

○ "I hate computers."
○ "I like fuzzy solutions."
○ "I refuse to think logically."
○ "I want to take an easy major."
  • Hard for those who find difficulty in logical thinking and who don't pay attention to precision.

❑ Answer: No

Should you be a CS major?

- ❍ "I want free gourmet meals and to make lots of money by working for Facebook/Google/LinkedIn/Apple"
- ❍ "World of Warcraft rocks hardcore!"
- ❍ "Everyone, look at my Facebook farm!"

❑ Answer: Yes/no

Should you be a CS major?

- ○ "I have to become a CS major."
- ○ "Computers and robots are going to take over the world. I want to befriend them so that my life will be spared."
- ○ "I like to solve computational problems."
- ○ …

❑ Answer: Yes

Get More Info, Get Involved

❑ Department web page: http://cpsc.yale.edu/
❑ DUS web page: http://dus.cs.yale.edu/
❑ Mailing lists
  ○ Majors in CS, CS and Math, CS and Psychology, and EE and CS are strongly encouraged to sign up for the cs mailing list: http://mailman.cs.yale.edu/mailman/listinfo/cs-majors
  ○ To receive related job opportunities, sign up http://mailman.cs.yale.edu/mailman/listinfo/cs-majors-jobs
❑ Many CS organizations (e.g., DSAC, …)