UF Herbert Wertheim College of Engineering
UNIVERSITY of FLORIDA

EGS 1006 - CISE

Computer & Information Science & Engineering

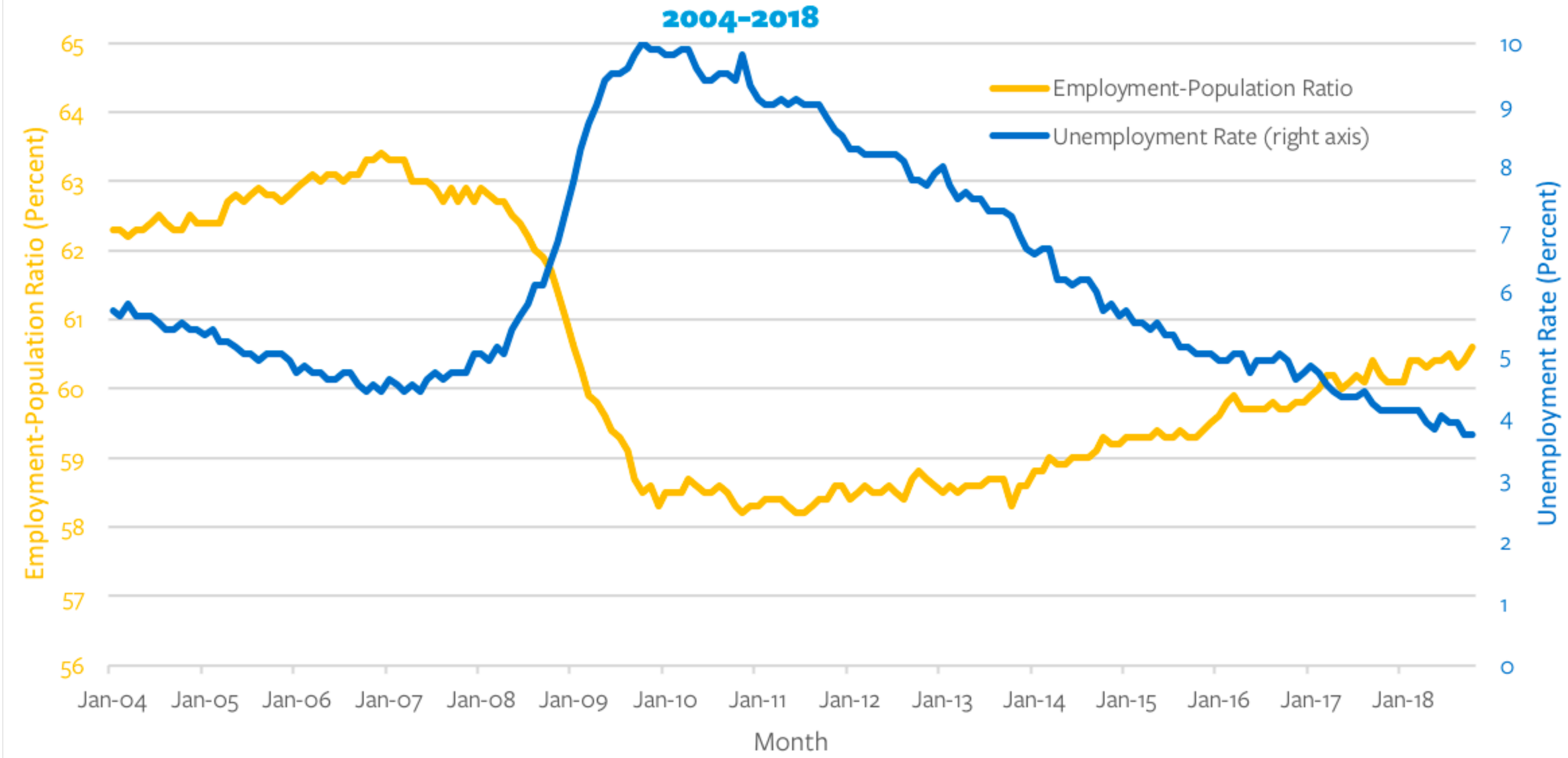
POWERING THE NEW ENGINEER TO TRANSFORM THE FUTURE

The CISE Department

Who we are…

- 17 NSF CAREER Award Winners
- 6 IEEE Fellows
- 3 AAAS Fellows
- 3 ACM Fellows
- 2 ACM Distinguished Scientists
- Presidential Award Winner

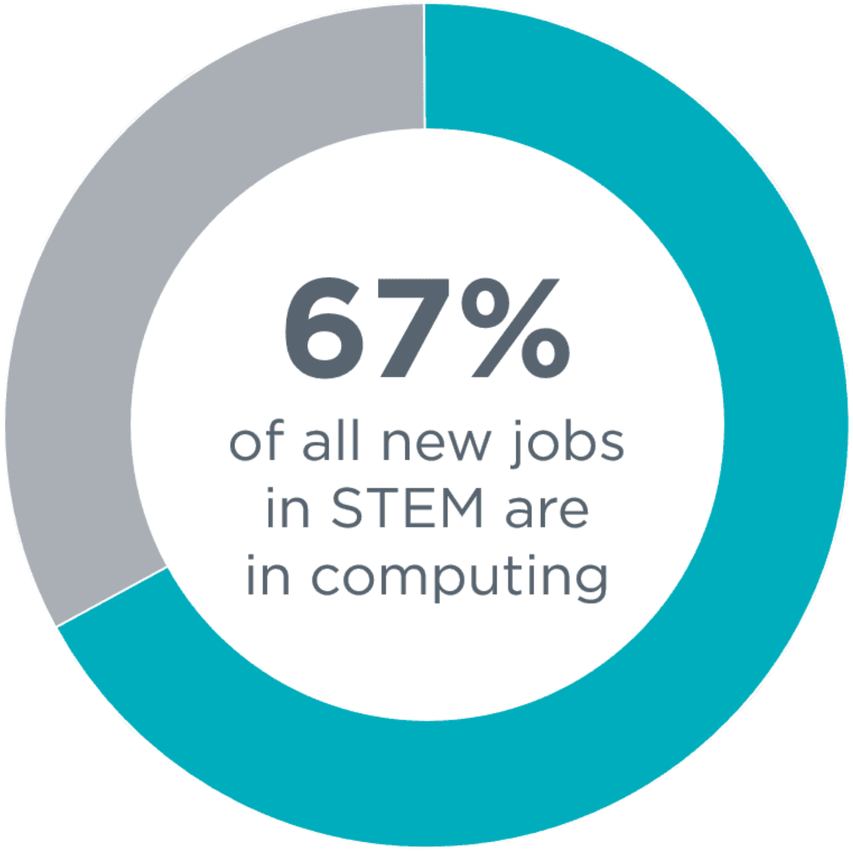
16 FULL PROFESSORS	**15** ASSOCIATE PROFESSORS
12 ASSISTANT PROFESSORS	**7** LECTURERS

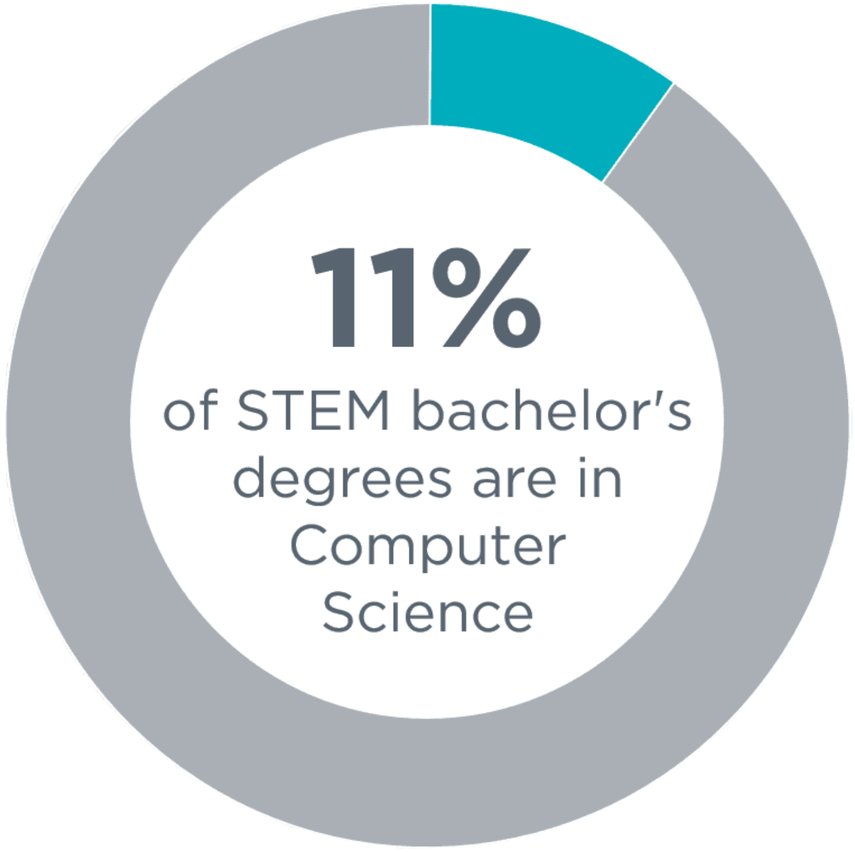

2004-2018
Employment-Population Ratio
Unemployment Rate (right axis)
Employment-Population Ratio (Percent)
Unemployment Rate (Percent)
65
64
63
62
61
60
59
58
57
56
10
9
8
7
6
5
4
3
2
1
0
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Month

10 HIGHEST-PAYING WORK FROM HOME JOBS

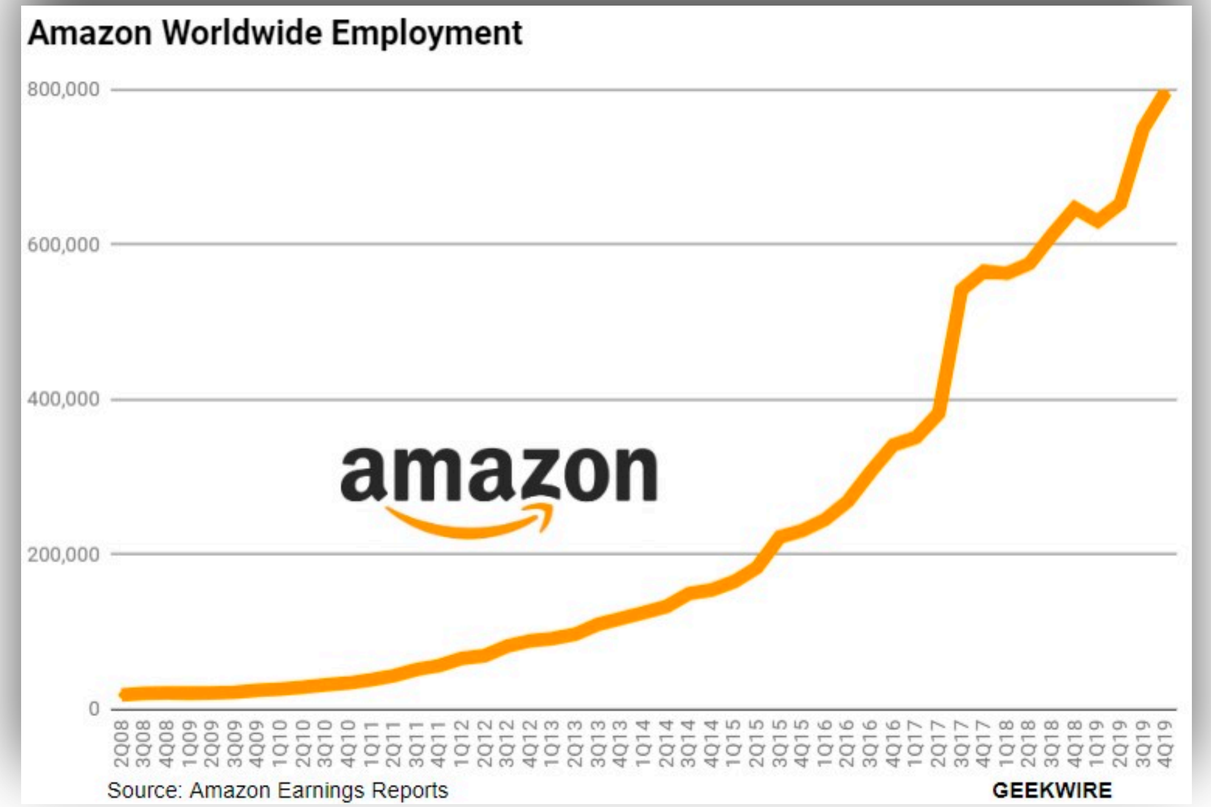
RANK	JOB TITLE	SALARY RANGE
1.	Sales Director	$130,000 - $200,000
2.	Senior Software Engineer	$100,000 - $200,000
3.	Senior Medical Writer	$110,000 - $115,000
4.	Director of Quality Improvement	$100,000 - $175,000
5.	Clinical Regulatory Affairs Director	$150,000 - $151,000
6.	iOS Developer	$100,000 - $120,000
7.	Director of Business Development	$100,000 - $151,000
8.	Cloud Engineer	$115,000 - $140,000

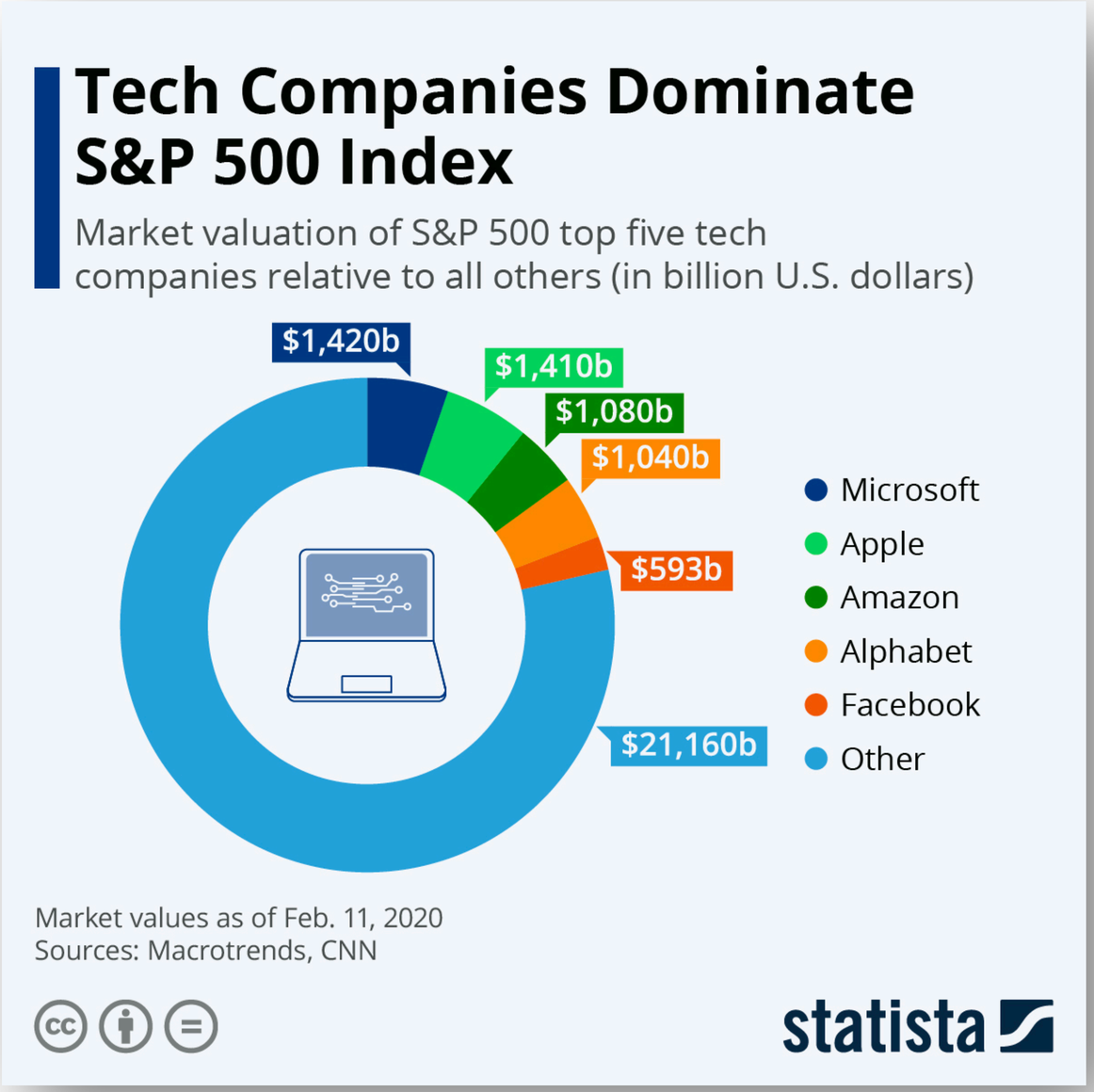
The Job/Student Gap in CS



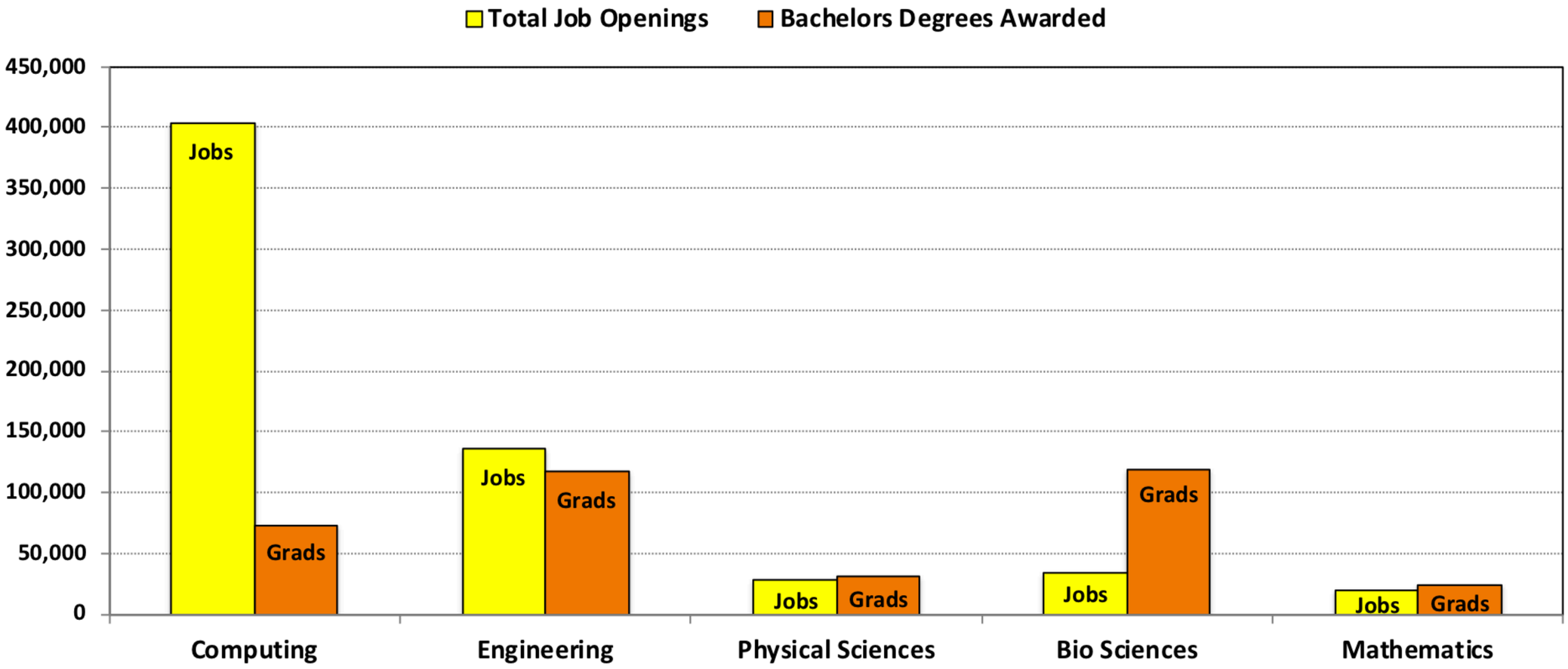


Tech is Hiring…





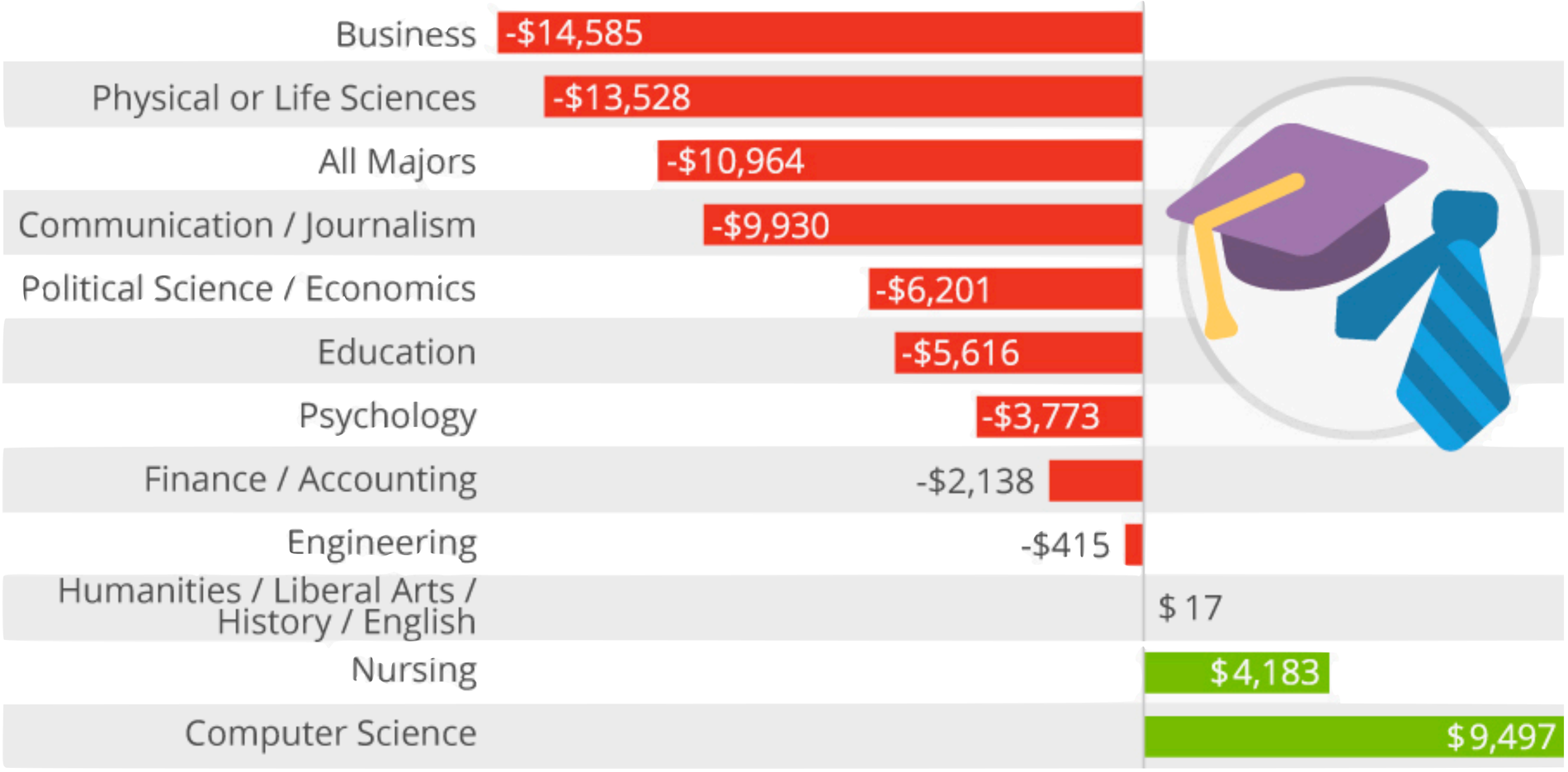
US-BLS Avg Annual STEM Openings Thru 2028 vs Recent Bachelors Degrees

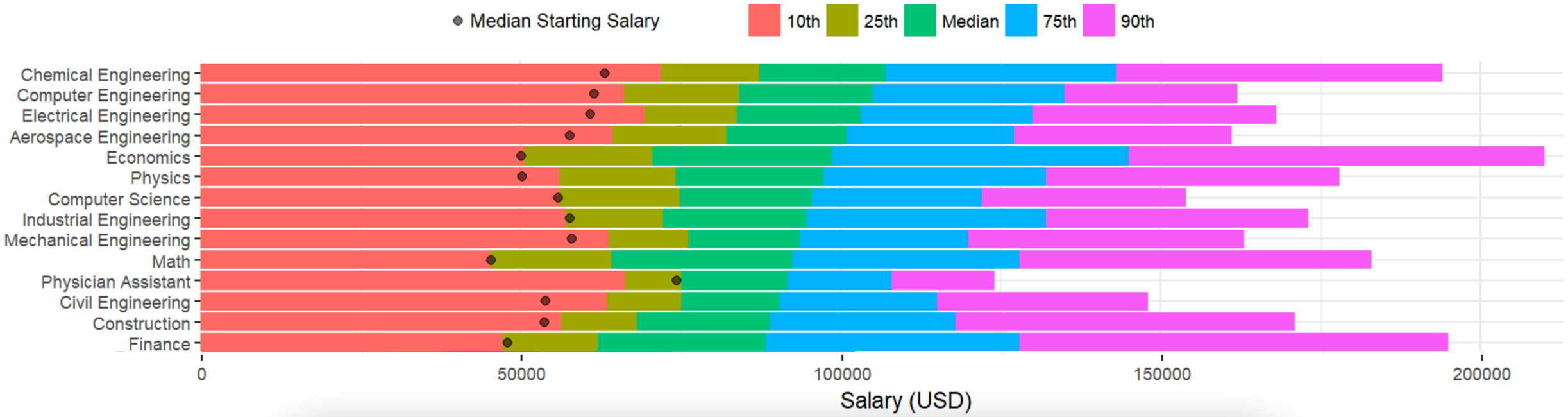


Data Sources: US-BLS Employment Projections (*https://www.bls.gov/emp/tables/emp-by-detailed-occupation.htm*)
National Science Foundation NCSES, 2017 Bachelors Degrees Awarded (*https://ncsesdata.nsf.gov/ids/ipeds_c*)

U.S. College Grads Are in For an Unpleasant Surprise

Gap between median annual early career salaries and average salary expectations*

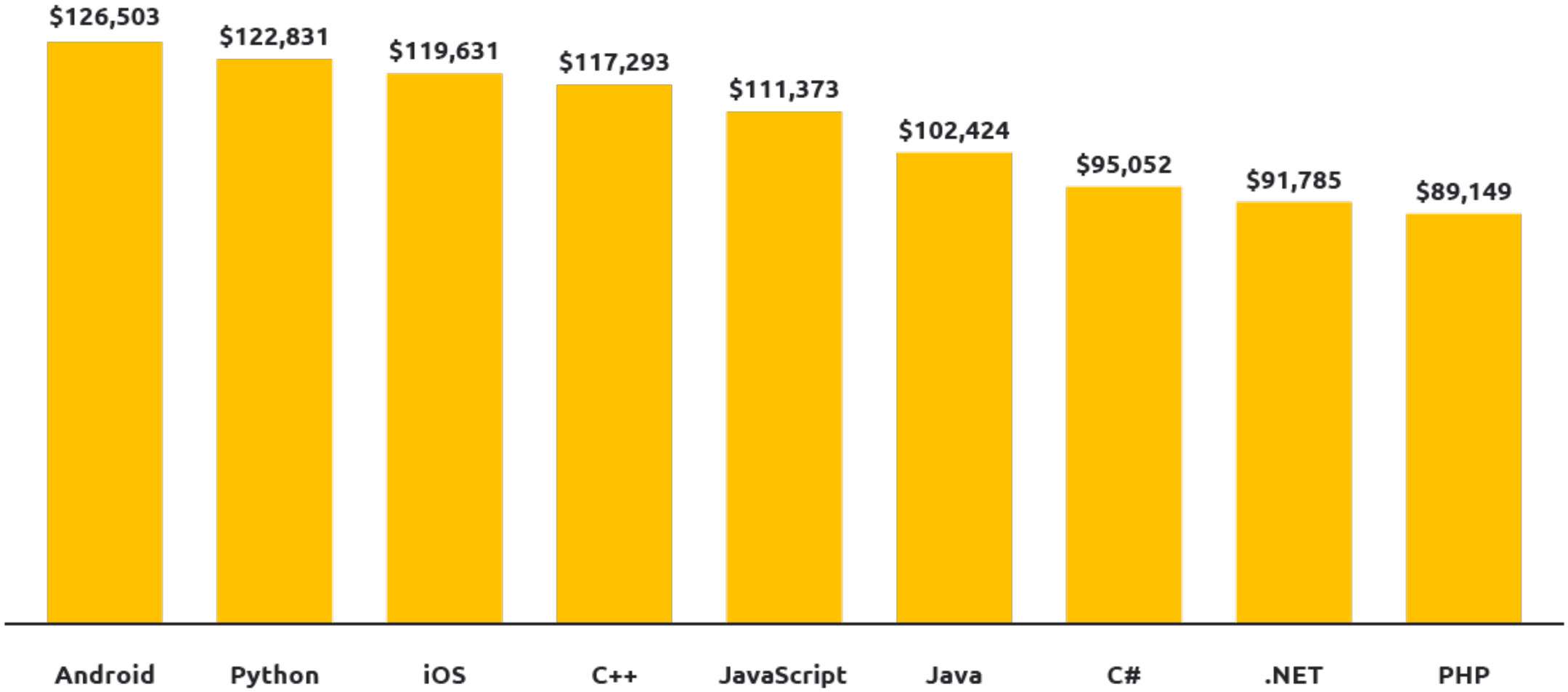




Rank	Undergraduate Major	Starting Median	Mid-Career Median
#1	Chemical Engineering	$63,200	$107,000
#2	Computer Engineering	$61,400	$105,000
#3	Electrical Engineering	$60,900	$103,000
#4	Aerospace Engineering	$57,700	$101,000
#5	Economics	$50,100	$98,600
#6	Physics	$50,300	$97,300
#7	Computer Science	$55,900	$95,500

SOFTWARE DEVELOPER SALARY, USA

DAXX



Computer science is a **top-paying college degree** and computer programming **jobs are growing at 2X the national average.**

NETWORK & COMPUTER SYSTEM ADMINS

12%

May 2012 Employment:	366,400
2022 Jobs Forecast:	409,400
Job Growth Forecast:	42,900

SOFTWARE DEVELOPERS, APPLICATIONS

23%

May 2012 Employment:	613,000
2022 Jobs Forecast:	752,900
Job Growth Forecast:	139,900

COMPUTER NETWORK ARCHITECTS

15%

May 2012 Employment:	143,400
2022 Jobs Forecast:	164,300
Job Growth Forecast:	20,900

COMPUTER HARDWARE ENGINEERS

7%

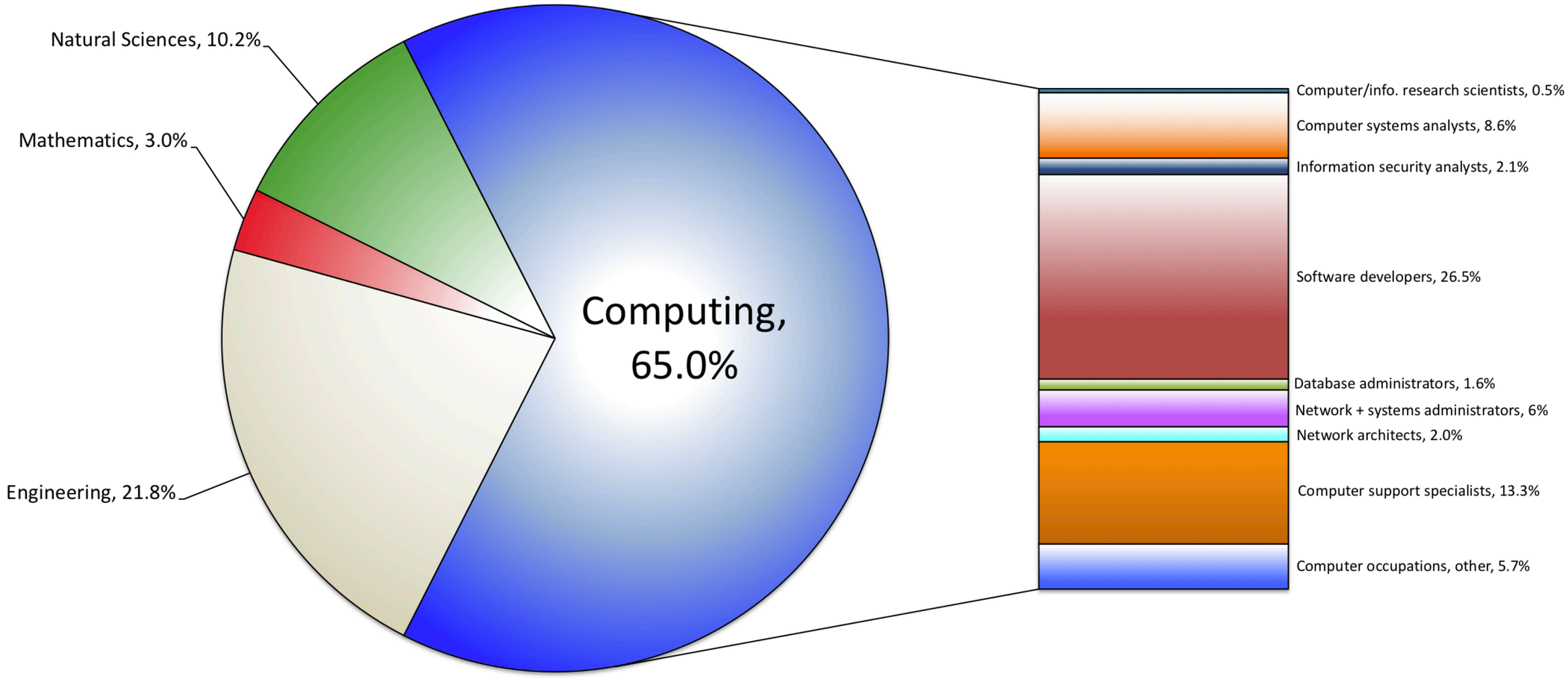
May 2012 Employment:	83,300
2022 Jobs Forecast:	89,400
Job Growth Forecast:	6,200

SOFTWARE DEVELOPERS, SYSTEMS SOFTWARE

20%

May 2012 Employment:	405,000
2022 Jobs Forecast:	487,800
Job Growth Forecast:	82,800

US-BLS Avg Annual STEM Job Openings Thru 2028 As Percentage



Data Source: US-BLS Employment Projections (*https://www.bls.gov/emp/tables/emp-by-detailed-occupation.htm*)

Top 10 Job Titles

- Software Engineer
- Systems Engineer
- Android Developer
- Java Developer
- Business Analyst
- .NET Developer
- Web Developer
- Systems Admin
- Project Manager
- Network Engineer

MTV News, 2006

MTV NEWS

Navigation

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- MTV Overdrive
- News Archive
- Movie Headlines
- Game Headlines
- Interviews
- News Correspondents
- You Hear It First
- You Tell Us

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Top Stories

UPDATED 06.14.2006 7:07 PM EDT

Only Heavyweights Need Apply To Busta's *Big Bang* Tour

He's not dropping names yet, but new guys with one hit single are only eligible to be the opening act. Established acts "give people their money's worth," said Rhymes, who just filmed a video for "New York Sh--" with Wu-Tang Clan and Rakim.

More

Jason Newsted Says Frantic Pace Of 'Rock Star: Supernova' Is 'Asking For Miracles'

mtvOVERDRIVE

Paris' Steamy Chat

'I put my everything into this record,' Hilton tells John Norris. See the recent interview, plus her first music video and more Paris clips from the vault.

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Personal · My Yahoo! · Addr Book · Calendar · Briefcase · Photos · Alerts · Bookmarks · Companion · Bill Pay · more...

Yahoo! Auctions - Bid, buy, or sell anything!

Categories	Items	Features
Antiques	Golf	Closed auctions
Autos	Hello Kitty	Charity auctions
Coins	X-Men memorabilia	PayDirect
Computers	Sailor Moon	My Auctions
Electronics		
Tickets		
Sports Cards		
Toys & Games		

Arts & Humanities
Literature, Photography...

News & Media
Full Coverage, Newspapers, TV...

Business & Economy
B2B, Finance, Shopping, Jobs...

Recreation & Sports
Sports, Travel, Autos, Outdoors...

Computers & Internet
Internet, WWW, Software, Games...

Reference
Libraries, Dictionaries, Quotations...

Education
College and University, K-12...

Regional
Countries, Regions, US States...

Entertainment
Cool Links, Movies, Humor, Music...

Science
Animals, Astronomy, Engineering...

In the News
- U.S. busts major Colombian drug ring
- U.A. pilots reach tentative pact
- Venezuelans win Little League World Series

more...

Marketplace
- Shopping: computers, videos, CDs, toys, electronics and more
- new! Yahoo! PayDirect - send and receive money online
- Free 56K Internet Access

Broadcast Events
- 9am ET : IPO Show
- 1pm : Cardinals vs. Braves
- 8pm : Georgia Tech vs. Virginia Tech

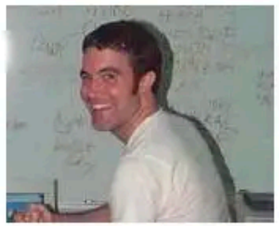
more...

Inside Yahoo!
- Y! Movies - Bring it On, Art of War, The Crew

MySpace, 2008

Tom

":-)"



Male
32 years old
Santa Monica, CALIFORNIA
United States

Last Login: 7/19/2008

Mood: refreshed

View My: Pics | Videos

Contacting Tom

- Send Message
- Forward to Friend
- Add to Friends
- Add to Favorites
- IM / Call
- Block User
- Add to Group
- Rank User

Tom its a great week.

Tom's Latest Blog Entry [Subscribe to this Blog]

[View All Blog Entries]

Tom's Blurbs

About me:
I'm Tom and I'm here to help you. Send me a message if you're confused by anything. Before asking me a question, please check the FAQ to see if your question has already been answered.

I may have been on your friend list when you signed up. If you don't want me to be, click "Edit Friends" and remove me!

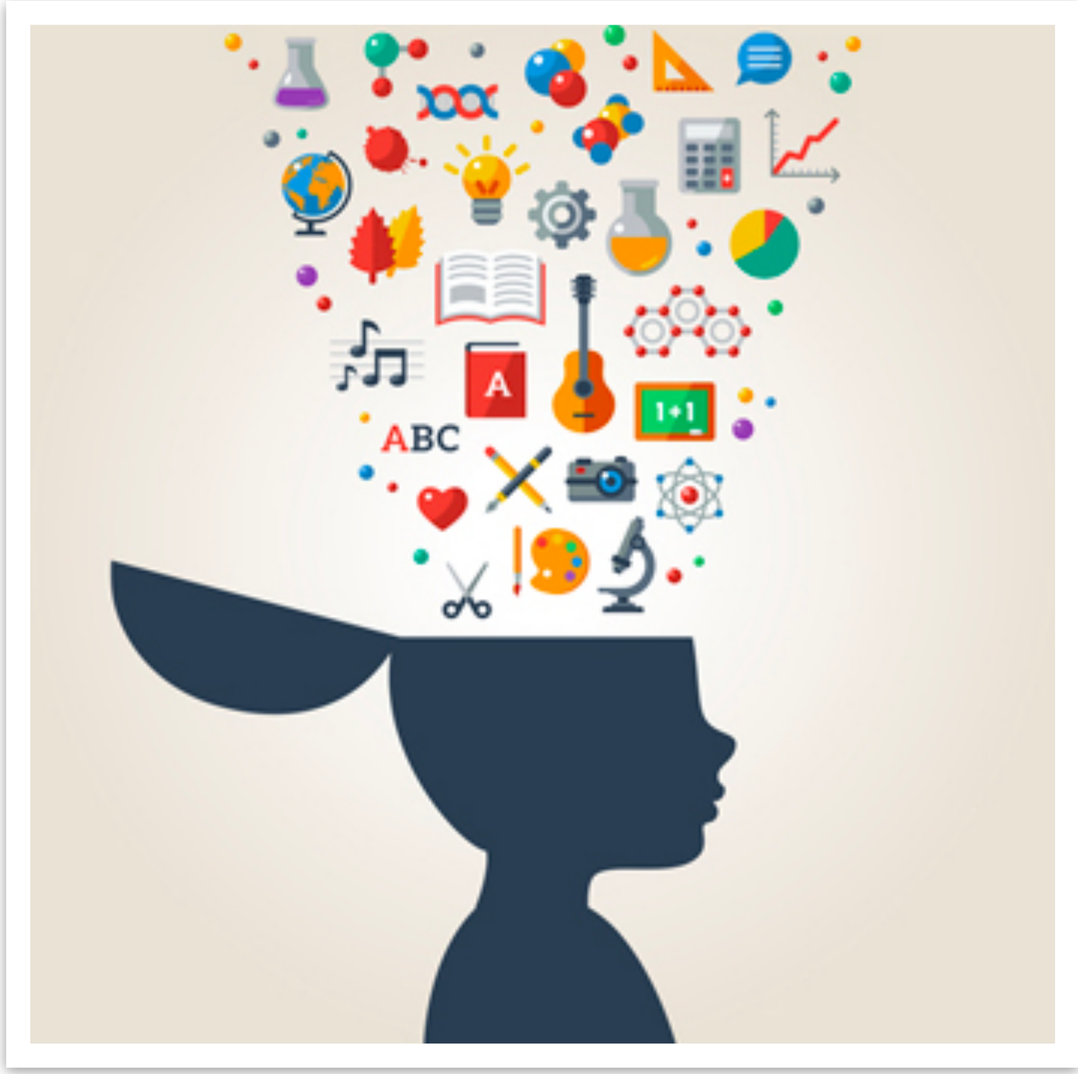
Also, feel free to tell me what features you want to see on MySpace and if I think it's cool, we'll do it!

Who I'd like to meet:

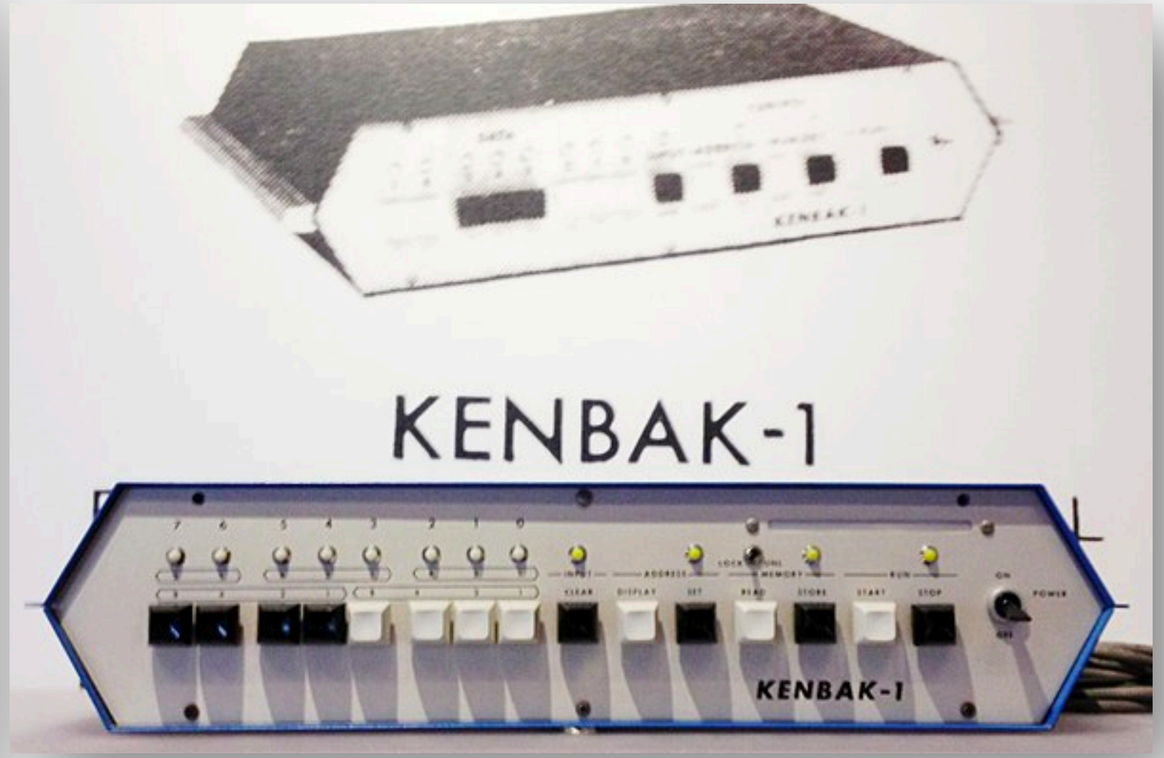
Want other reasons to join?

Freedom of Choice

- Work in any field
- CS is…
  - a relatively new field
  - growing fast
- New field = New ideas
  - not just in CS but in all disciplines



ENIAC - First Electronic Digital Computer (1945)

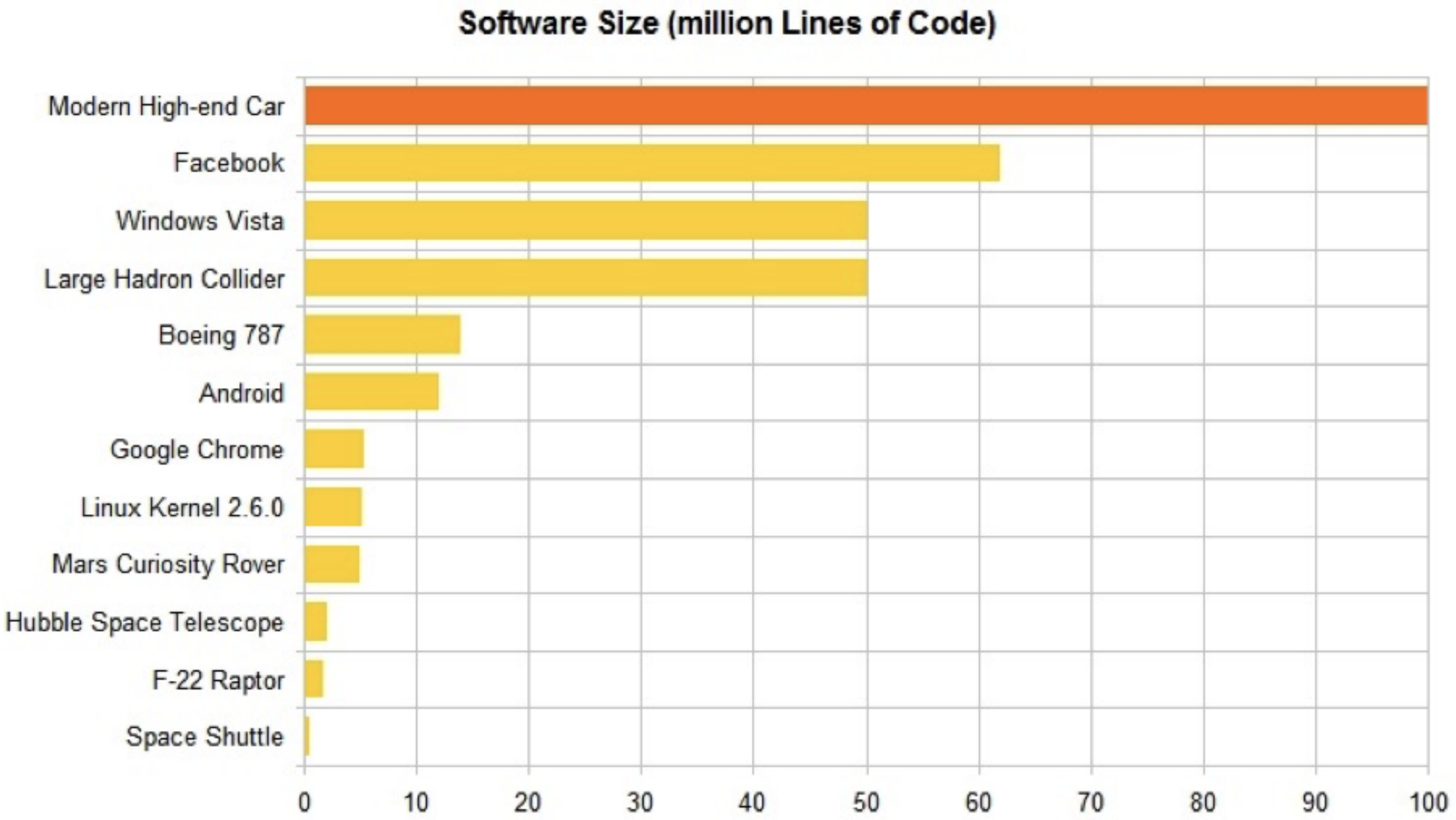


First Personal Computer (1971)

CARSCOOPS

South Korea Fines Mercedes, Porsche And Nissan For Diesel Emission Cheating Software

BY SERGIU TUDOSE | MAY 6, 2020 6

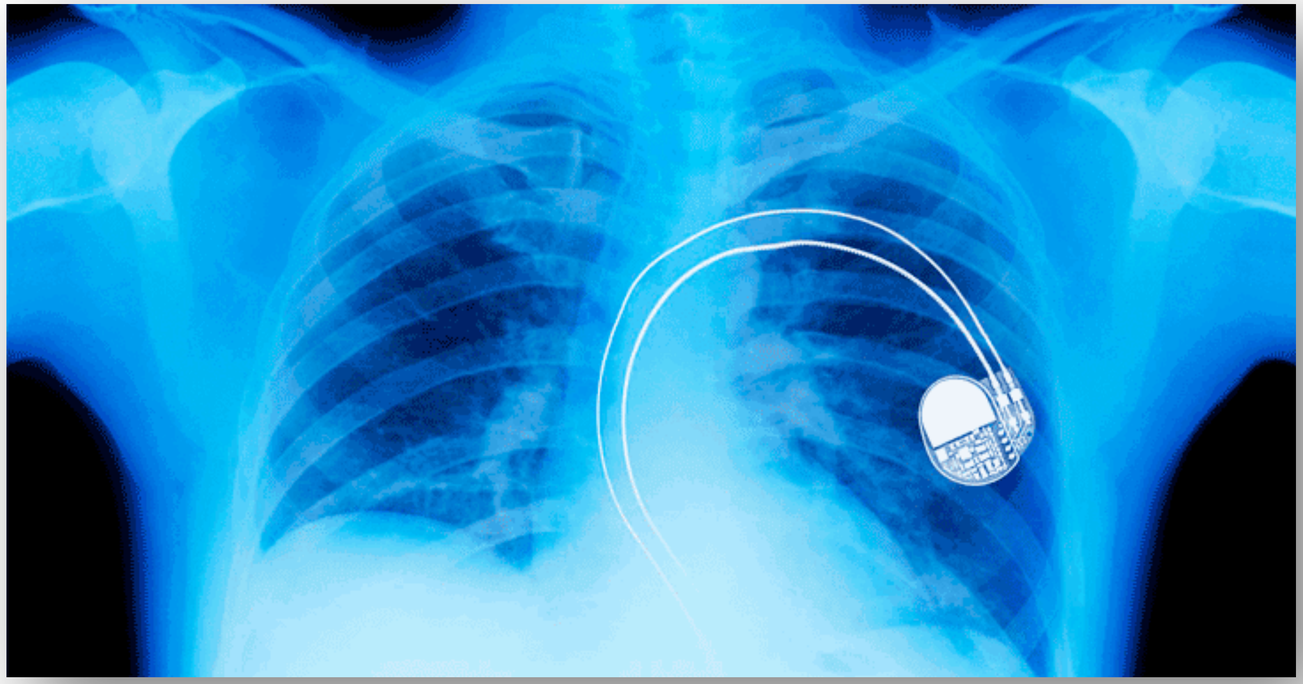

Software Size (million Lines of Code)
Modern High-end Car
Facebook
Windows Vista
Large Hadron Collider
Boeing 787
Android
Google Chrome
Linux Kernel 2.6.0
Mars Curiosity Rover
Hubble Space Telescope
F-22 Raptor
Space Shuttle
0
10
20
30
40
50
60
70
80
90
100

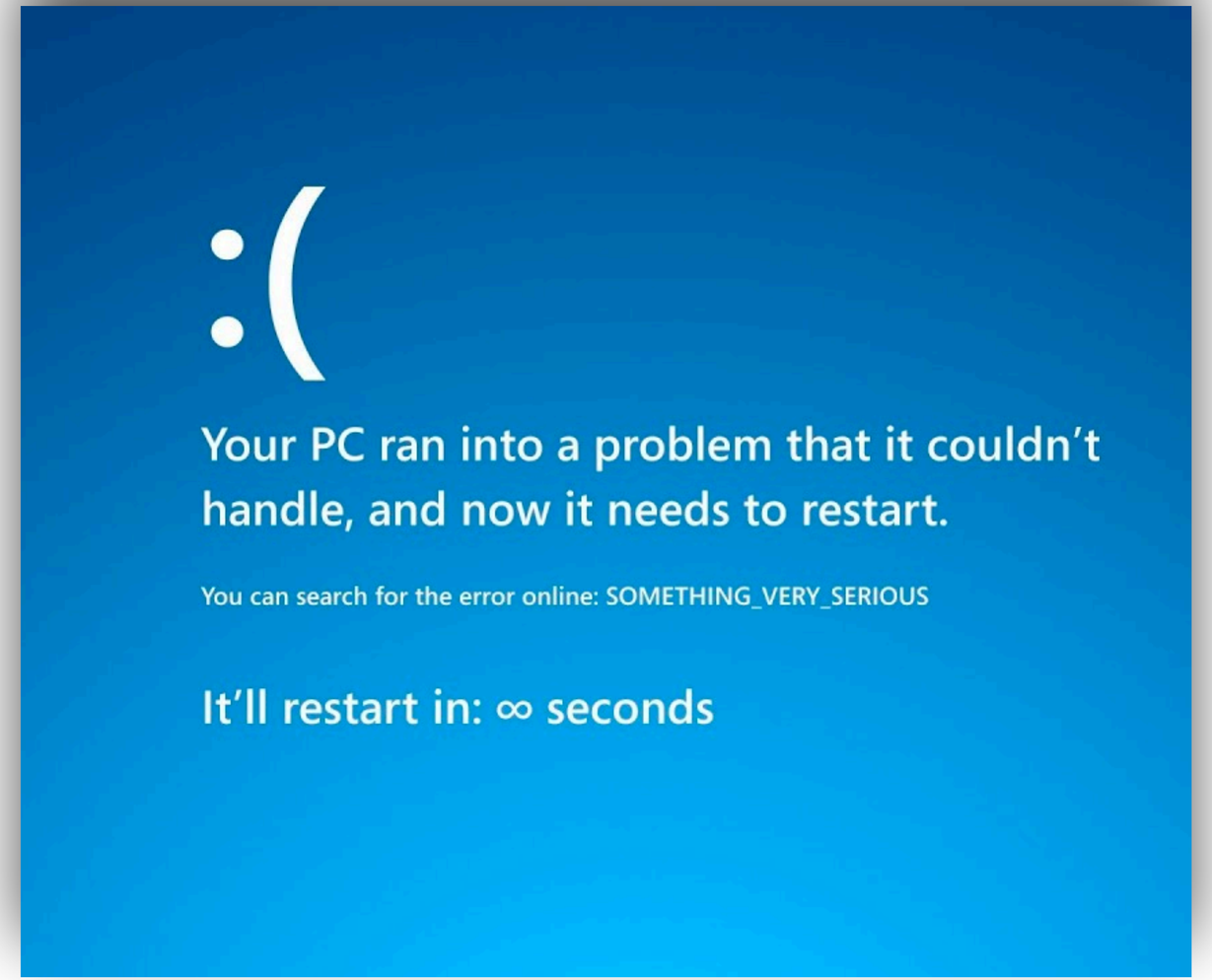
The Hacker News

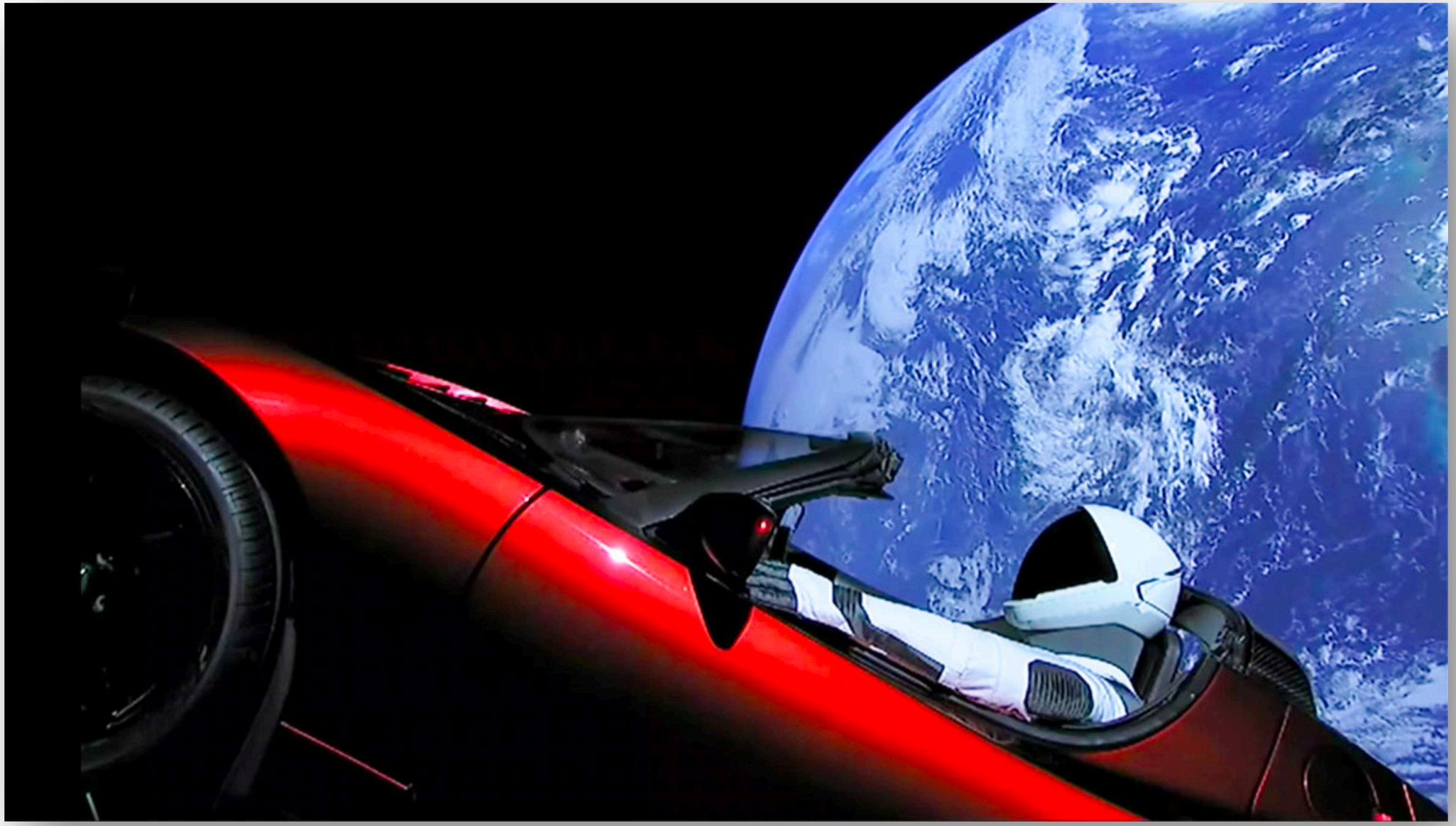
Subscribe to Newsletter

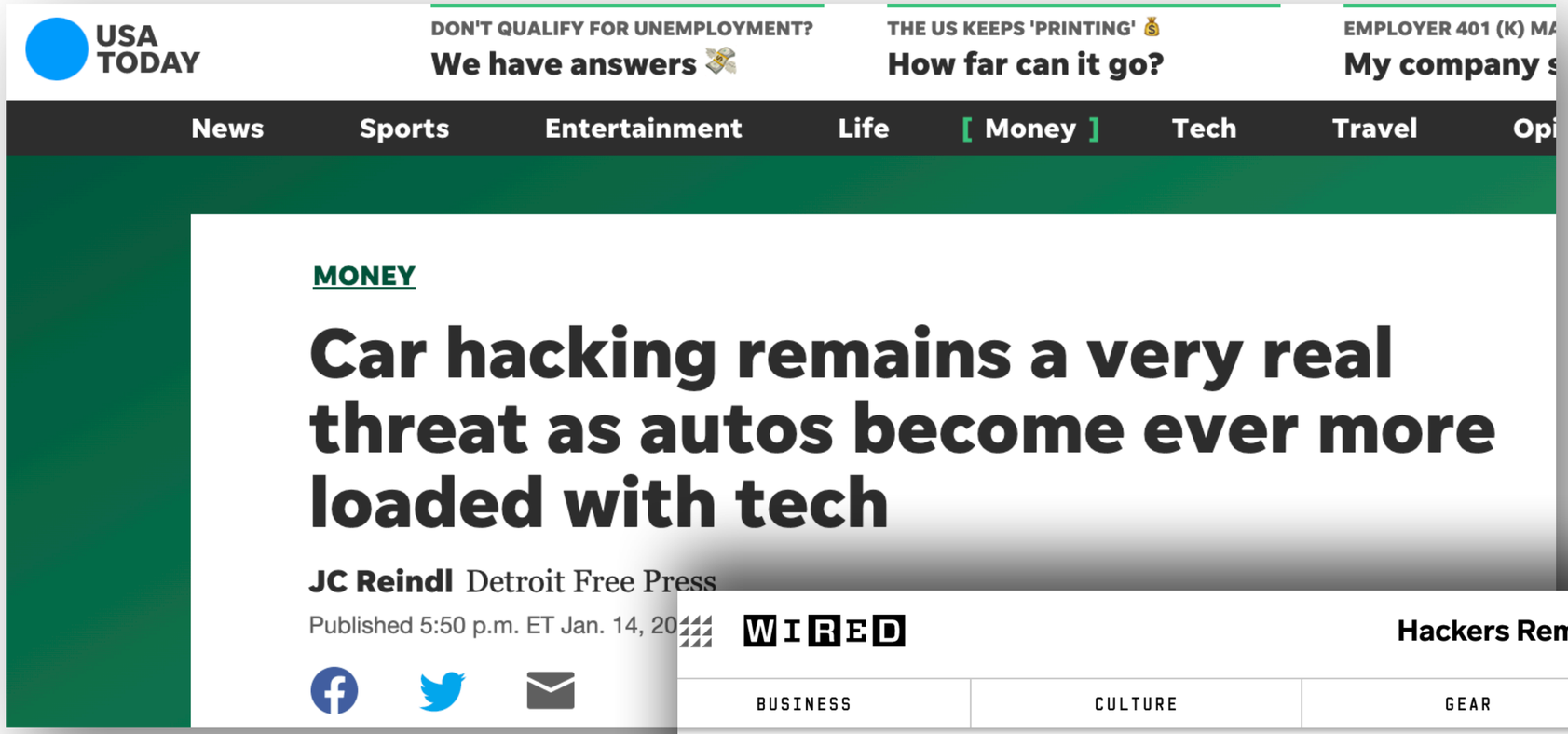
FDA Recalls Nearly Half a Million Pacemakers Over Hacking Fears

September 01, 2017 Swati Khandelwal




:(
Your PC ran into a problem that it couldn't handle, and now it needs to restart.
You can search for the error online: SOMETHING_VERY_SERIOUS
It'll restart in: ∞ seconds




USA TODAY
DON'T QUALIFY FOR UNEMPLOYMENT?
We have answers
THE US KEEPS 'PRINTING'
How far can it go?
EMPLOYER 401 (K) MA
My company s
News Sports Entertainment Life [Money] Tech Travel Opi
MONEY
Car hacking remains a very real threat as autos become ever more loaded with tech
JC Reindl Detroit Free Press
Published 5:50 p.m. ET Jan. 14, 20

WIRED
Hackers Remotely Kill a Jeep on the Highway—With Me in It
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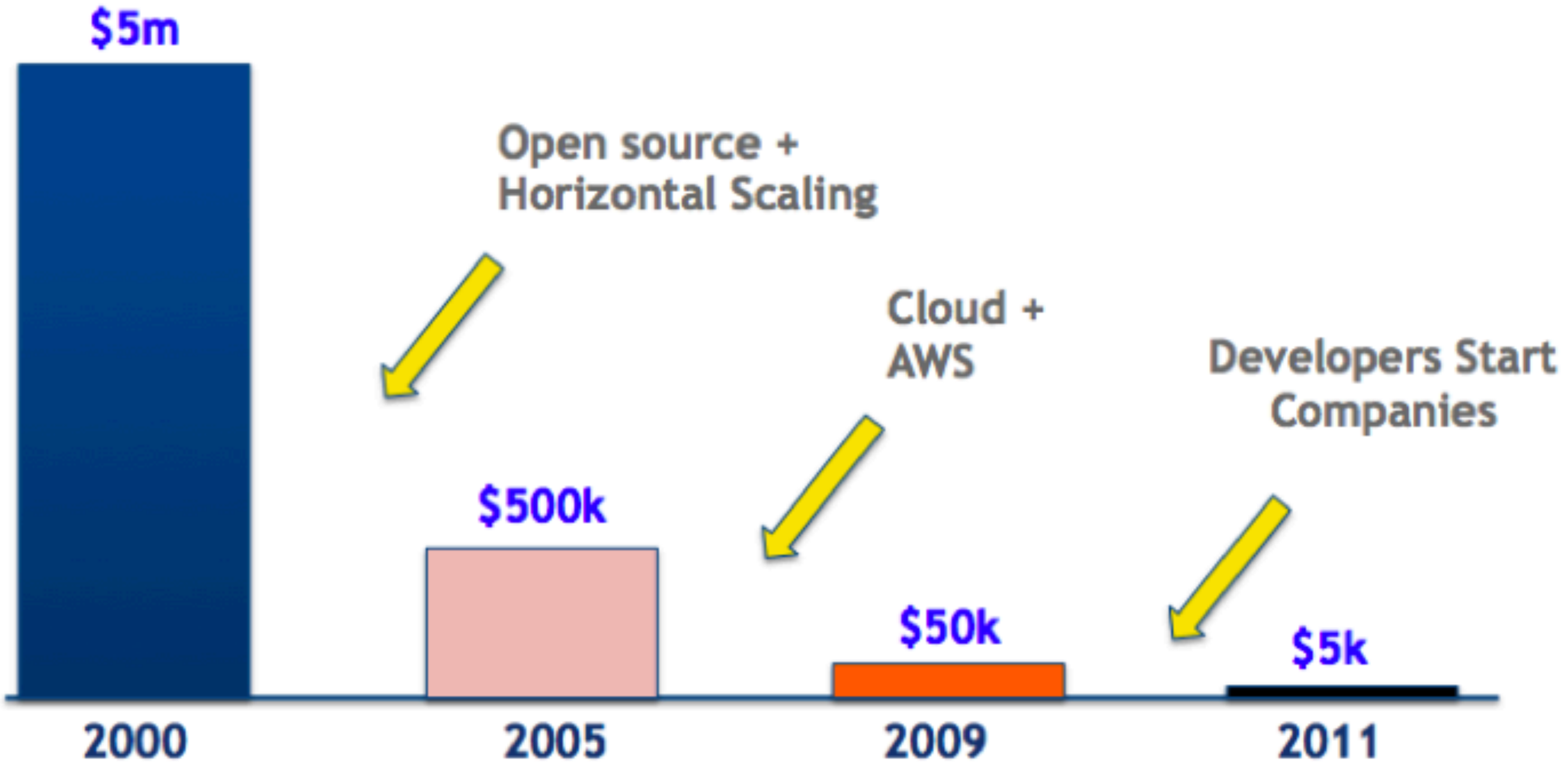
Hackers Remotely Kill a Jeep on the Highway—With Me in It

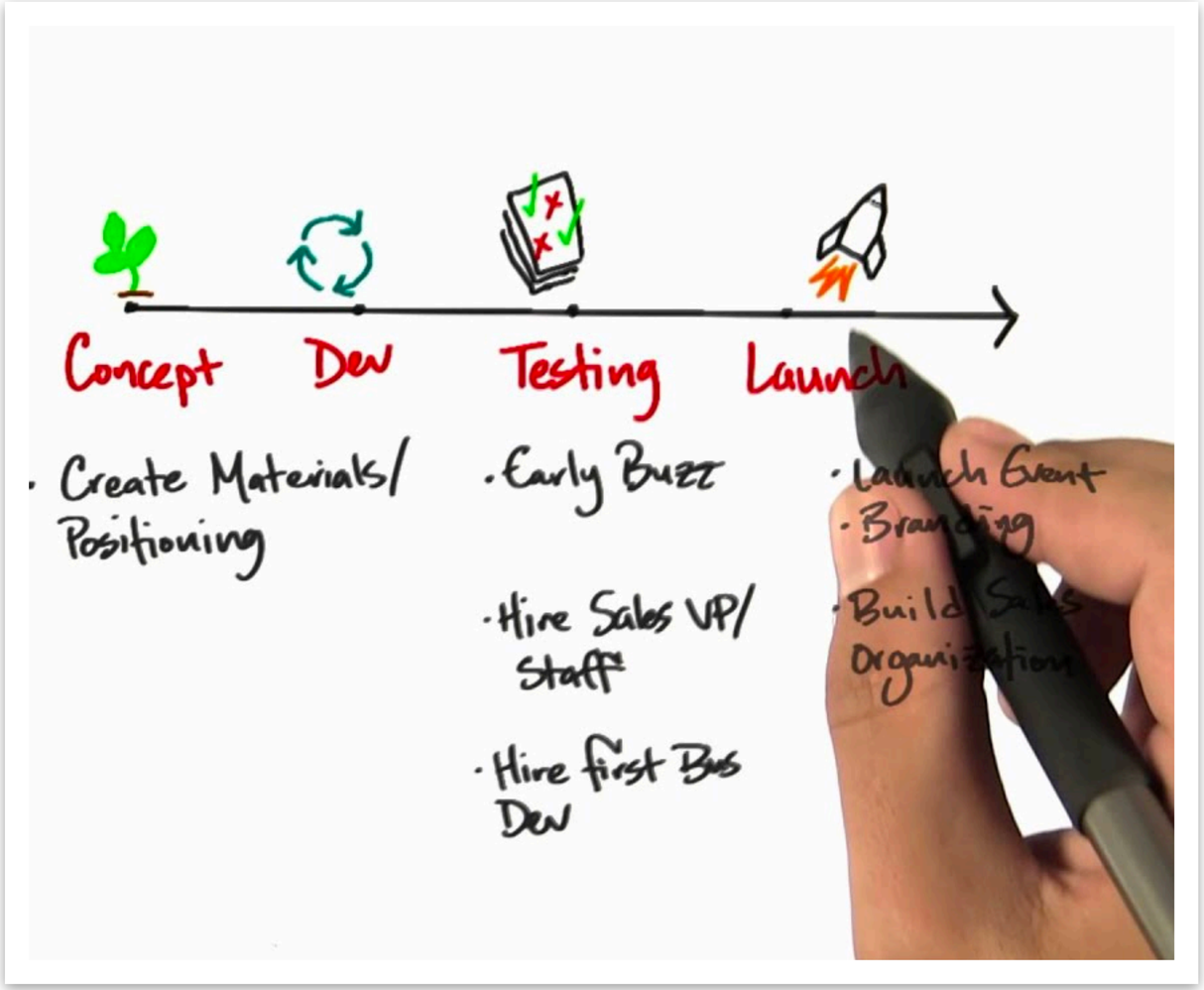
Costs to Launch an Internet Tech Startup



Rely on Oracle Linux Support

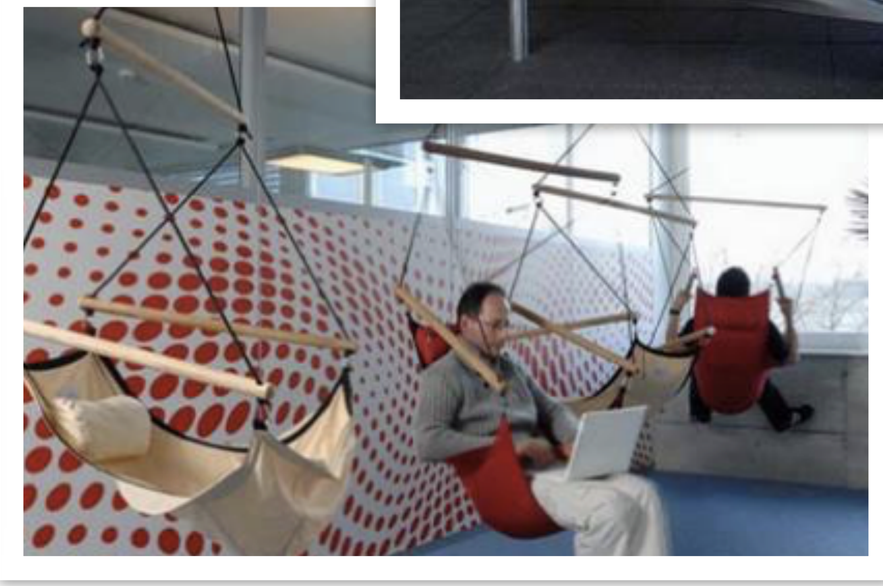
Low Startup Cost

- Have an idea?
  - No venture capital needed
- Startups largely tech-based
- Open source software
  - tools you can use for free
- No limit on ideas to pursue



Young & Innovative Field

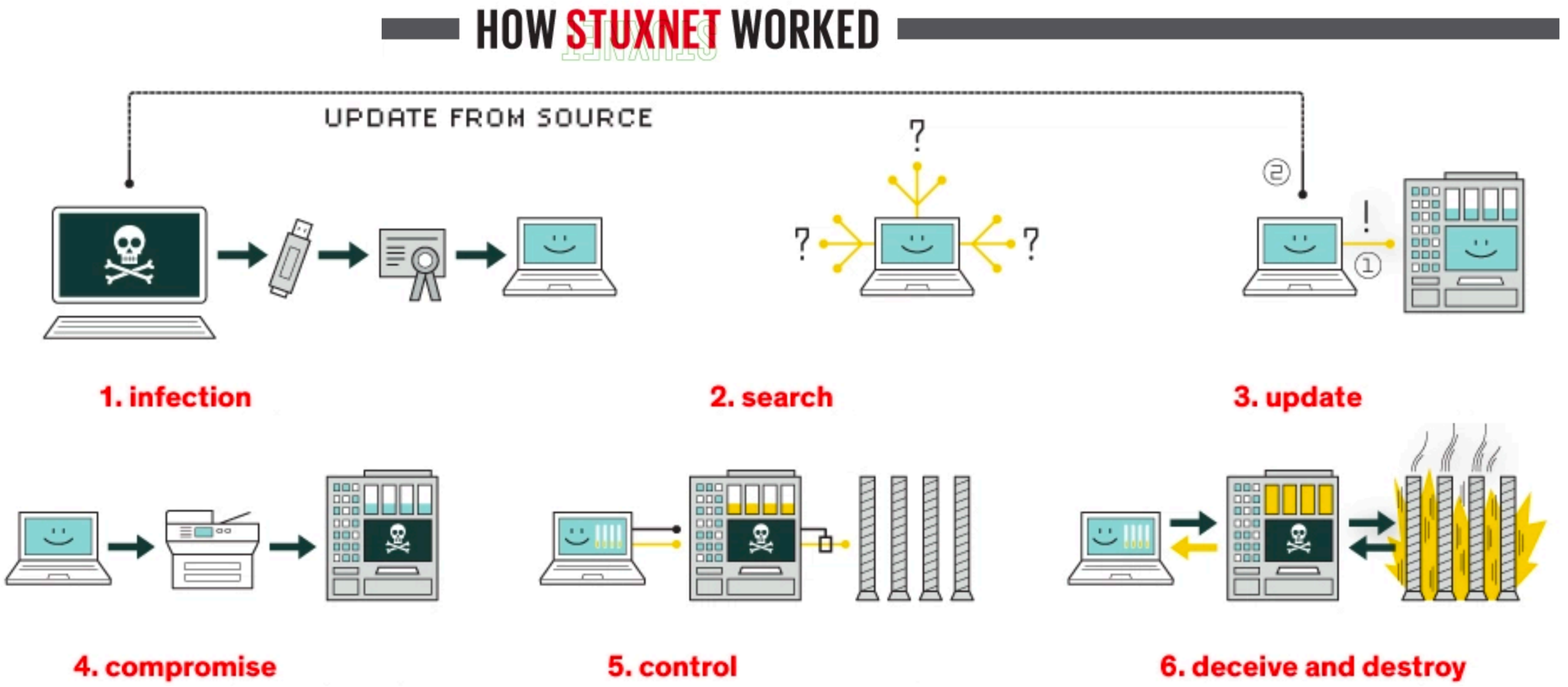
- Innovative work environments
- Youthful work force
- Vested interest in technology



I've been trying to text you all day.
That's a calculator.

TRACKING MY COOKIES?
YOU WILL NEVER GET MY RECIPE INTERNET!

STUXNET


HOW STUXNET WORKED
UPDATE FROM SOURCE
1. infection
2. search
3. update
4. compromise
5. control
6. deceive and destroy

NSA Scandal

TOP SECRET//SI//ORCON//NOFORN

(TS//SI//NF) PRISM Collection Details

Current Providers

- Microsoft (Hotmail, etc.)
- Google
- Yahoo!
- Facebook
- PalTalk
- YouTube
- Skype
- AOL
- Apple

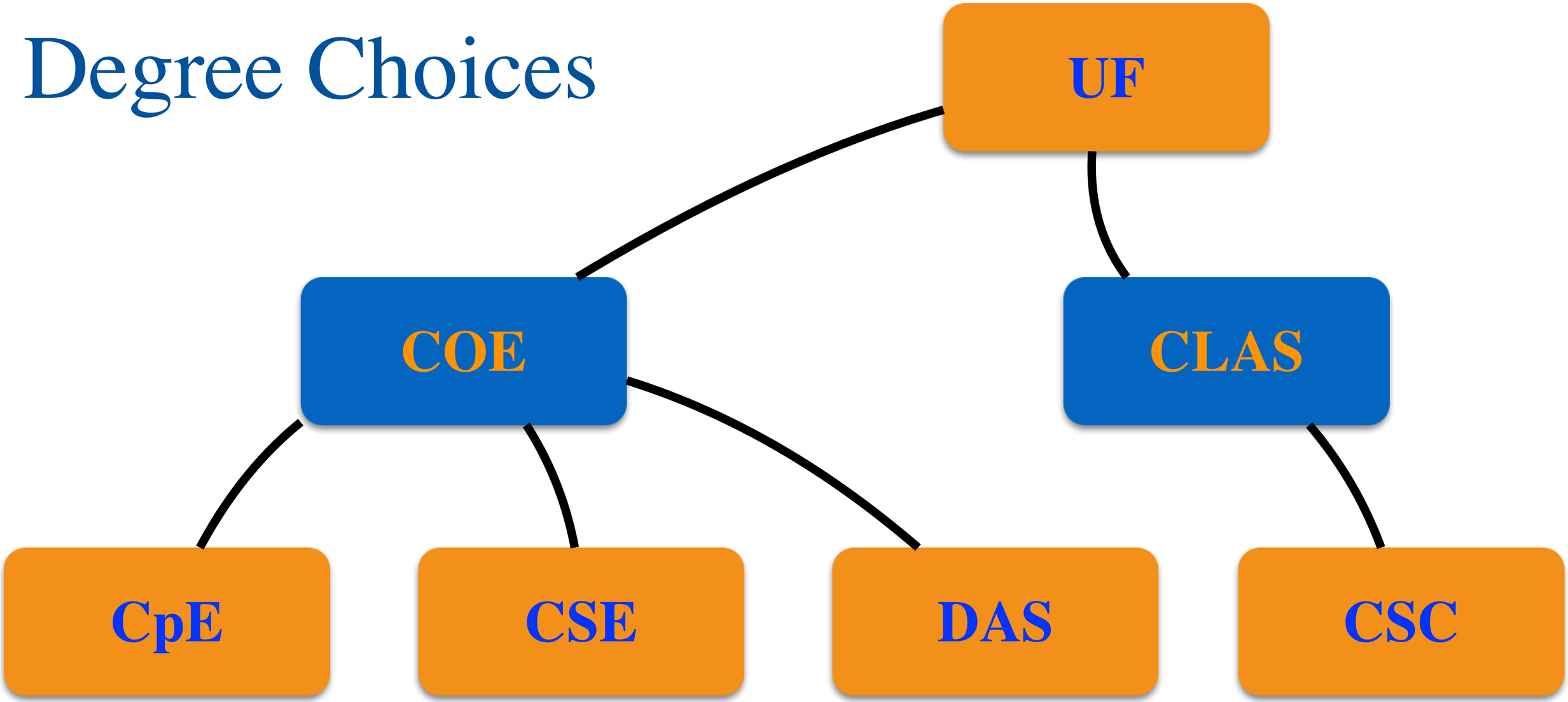
What Will You Receive in Collection (Surveillance and Stored Comms)?
It varies by provider. In general:

- E-mail
- Chat – video, voice
- Videos
- Photos
- Stored data
- VoIP
- File transfers
- Video Conferencing
- Notifications of target activity – logins, etc.
- Online Social Networking details
- **Special Requests**

Complete list and details on PRISM web page:
Go PRISMFAA

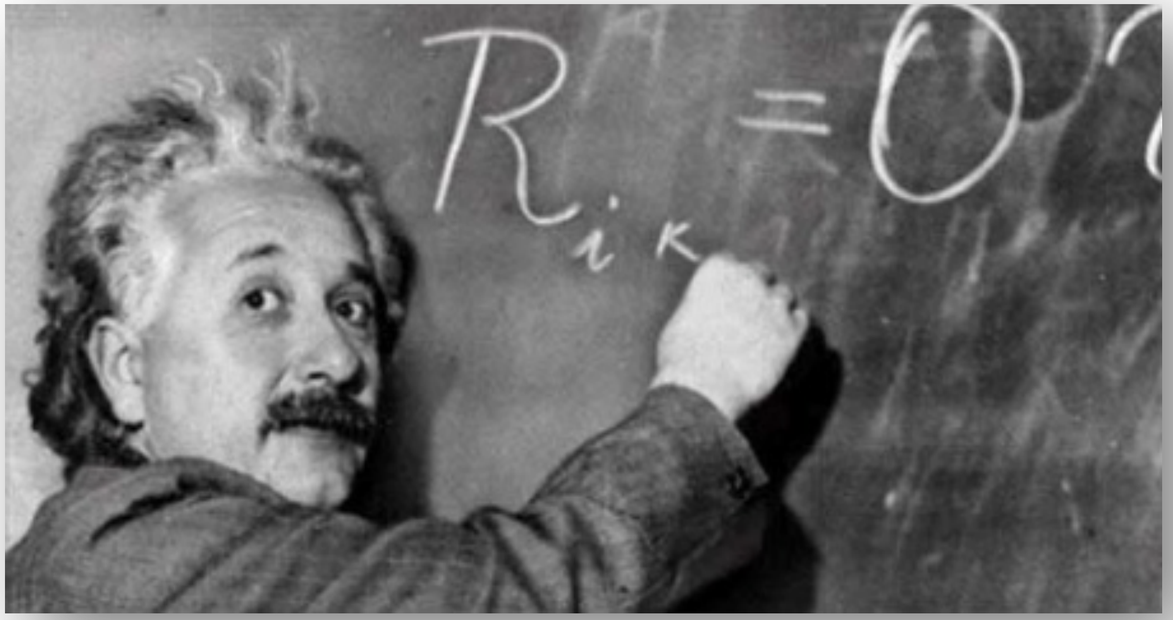
TOP SECRET//SI//ORCON//NOFORN

Degree Choices



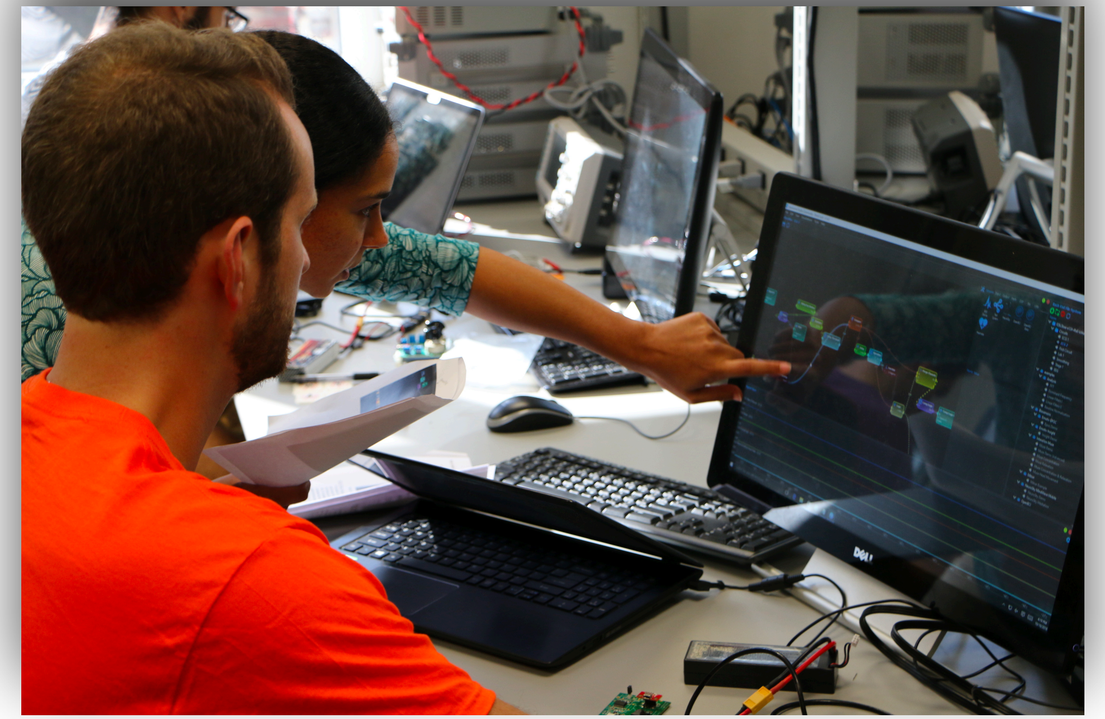
Computer Engineering (CpE)

- First and Second Year
  - Background Courses
  - Math: Calc (1-3), Differential Equations, Linear Algebra
  - Physics, Chemistry, etc.
  - General Engineering Cores



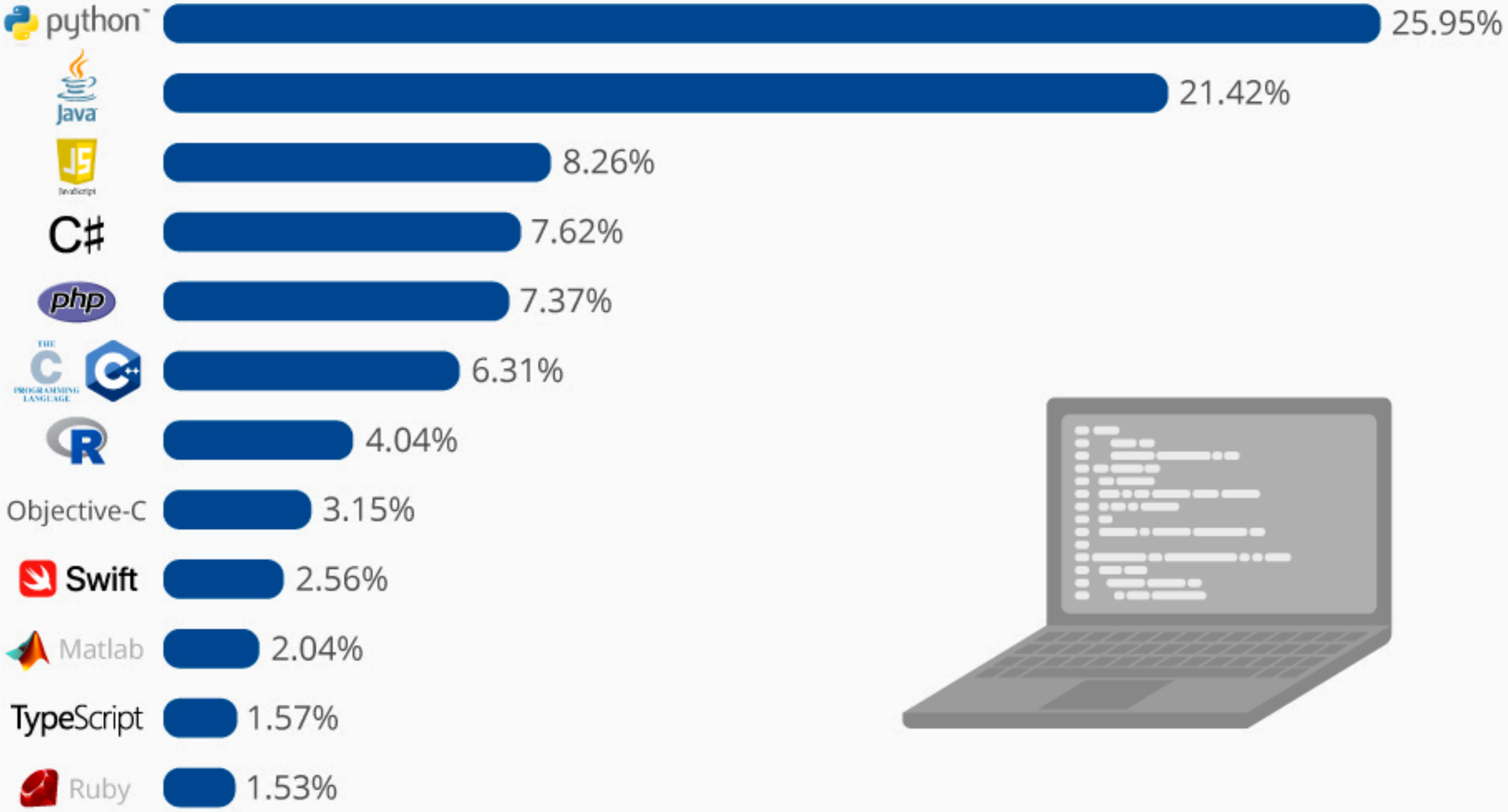
Computer Engineering (CpE)

- Major Classes
  - Programming, Discrete, Comp Org, Data Structures, Algorithms, OS, Soft Eng, Networks, Digital Logic
- Tech Electives
  - AI, Graphics, Databases, etc.
- Pursue your interest!



The Most Popular Programming Languages

Share of the most popular programming languages in the world*



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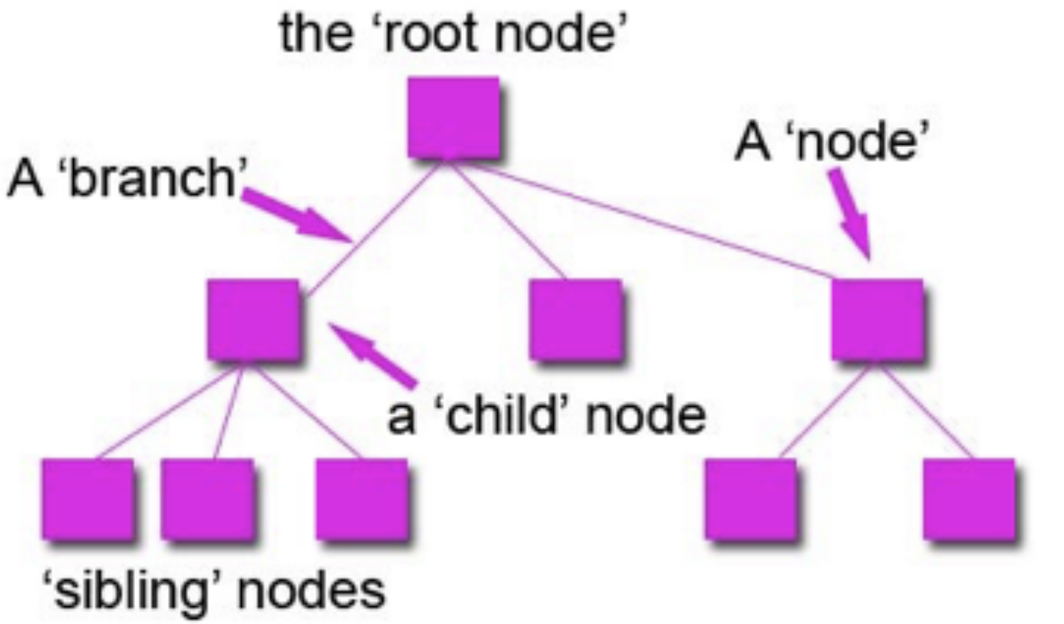


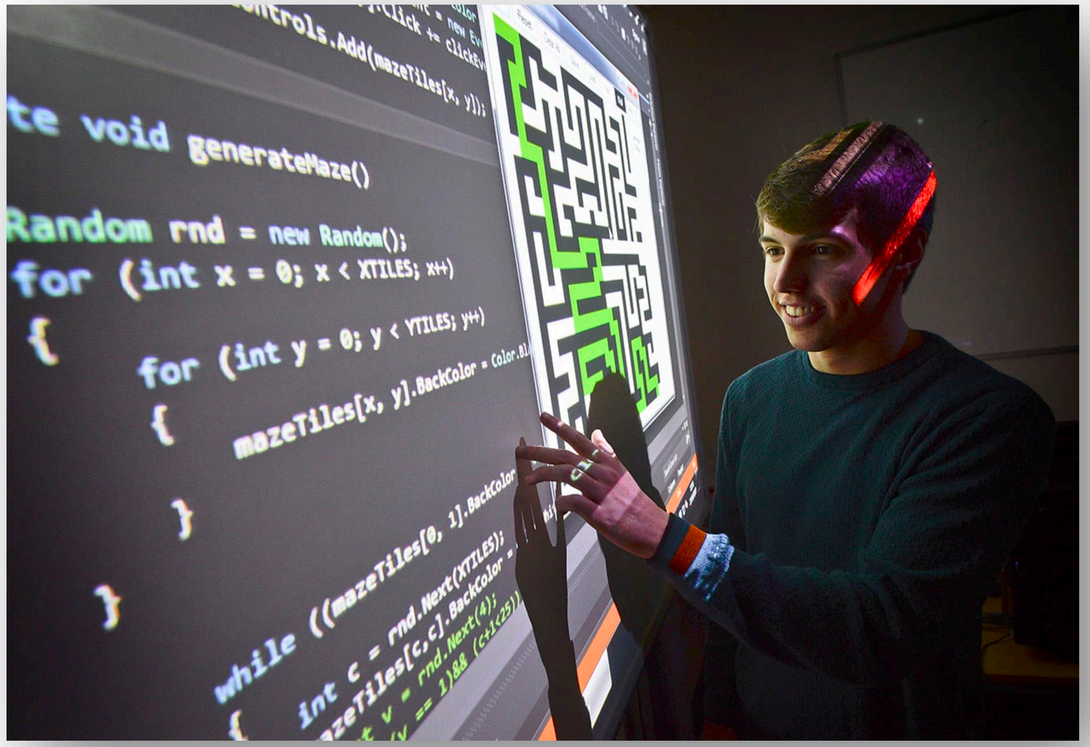
PARTS OF A TREE DATA STRUCTURE

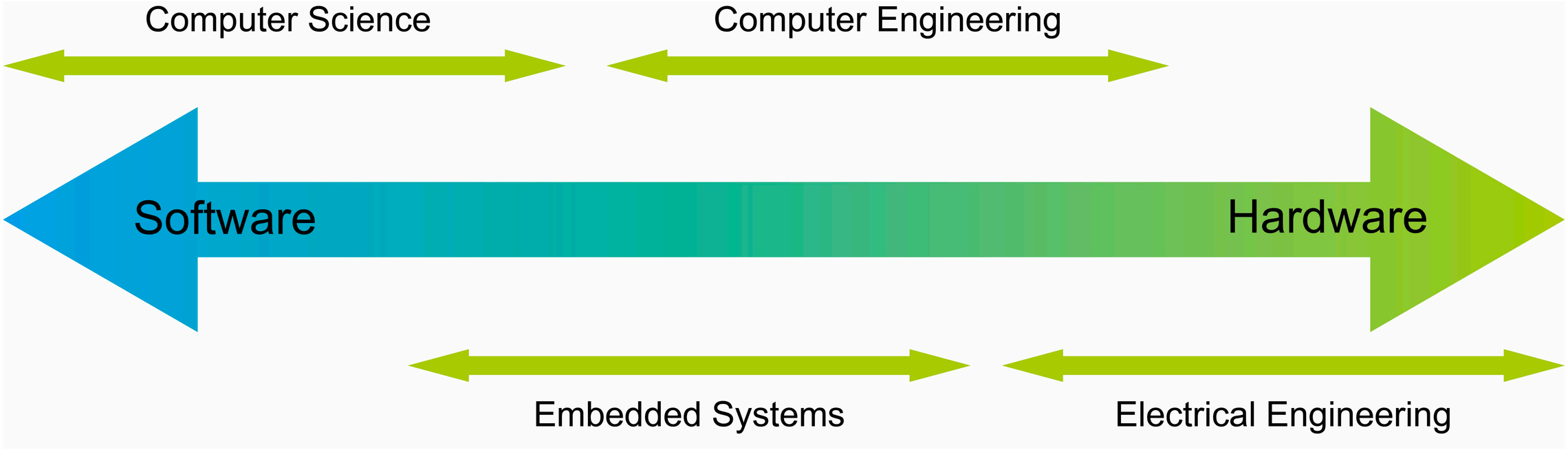
Computer Engineering (CpE)

- Major Classes
  - Programming, Discrete, Comp Org, Data Structures, Algorithms, OS, Soft Eng, Networks, Digital Logic
- Tech Electives
  - AI, Graphics, Databases, etc.
- Pursue your interest!

Computer Science (CSE)

- Same background and similar major courses as CpE
- Differences with CpE
  - interdisciplinary electives, can be outside Dept./College
  - communication classes




Computer Science
Computer Engineering
Software
Hardware
Embedded Systems
Electrical Engineering

Computer Science (CSC)

- Same background and similar major courses as CSE
- Differences with CSE
  - take courses outside in non-CS areas
  - more flexibility for non-CS career

Digital Arts/Sci (DAS)

- Same background as CSE
- Differences
  - Art classes
  - Animation, Audio,
  - Interface, GPUs, Gaming
  - Interdisciplinary courses

New Virtual Reality Experience - Disney

Digital Arts/Sci (DAS)

- Same background as CSE
- Differences
  - Art classes
  - Animation, Audio,
  - Interface, GPUs, Gaming
  - Interdisciplinary courses

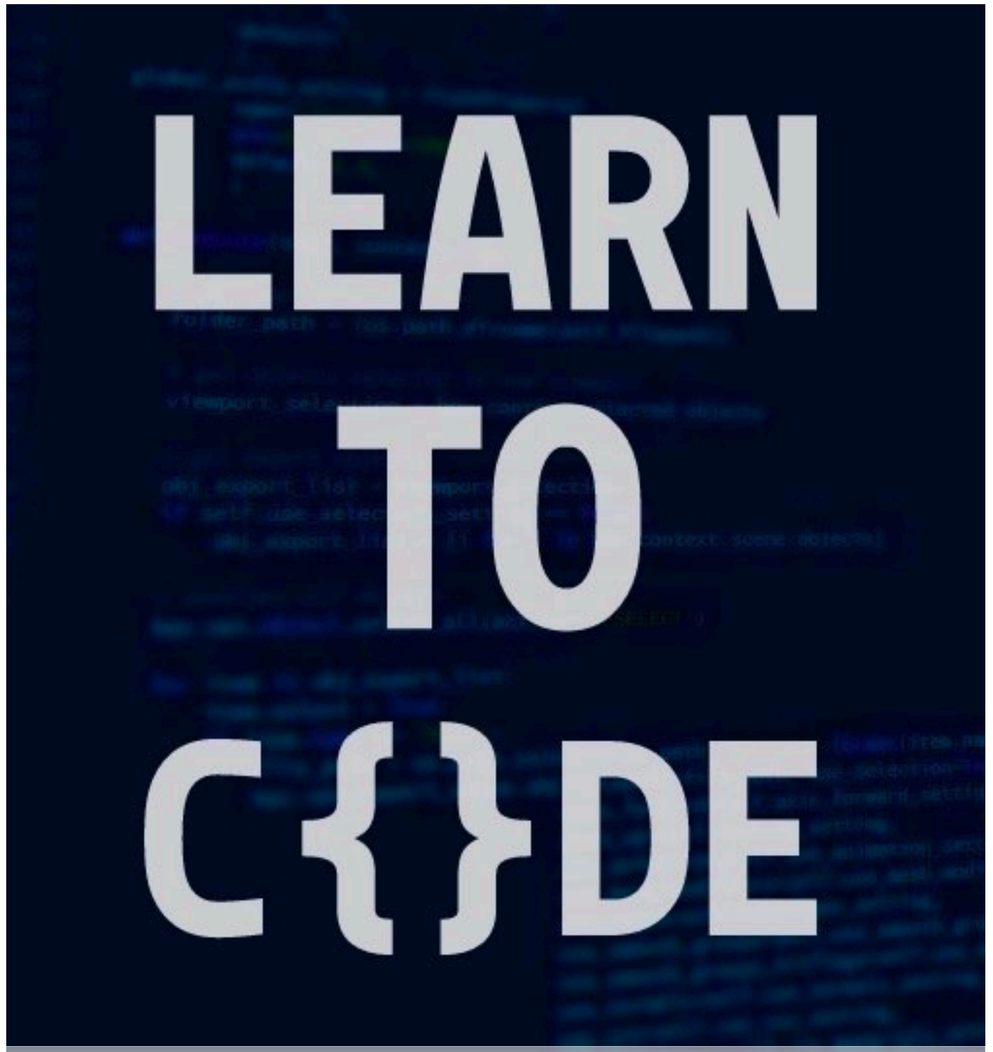
UF Reality Lab

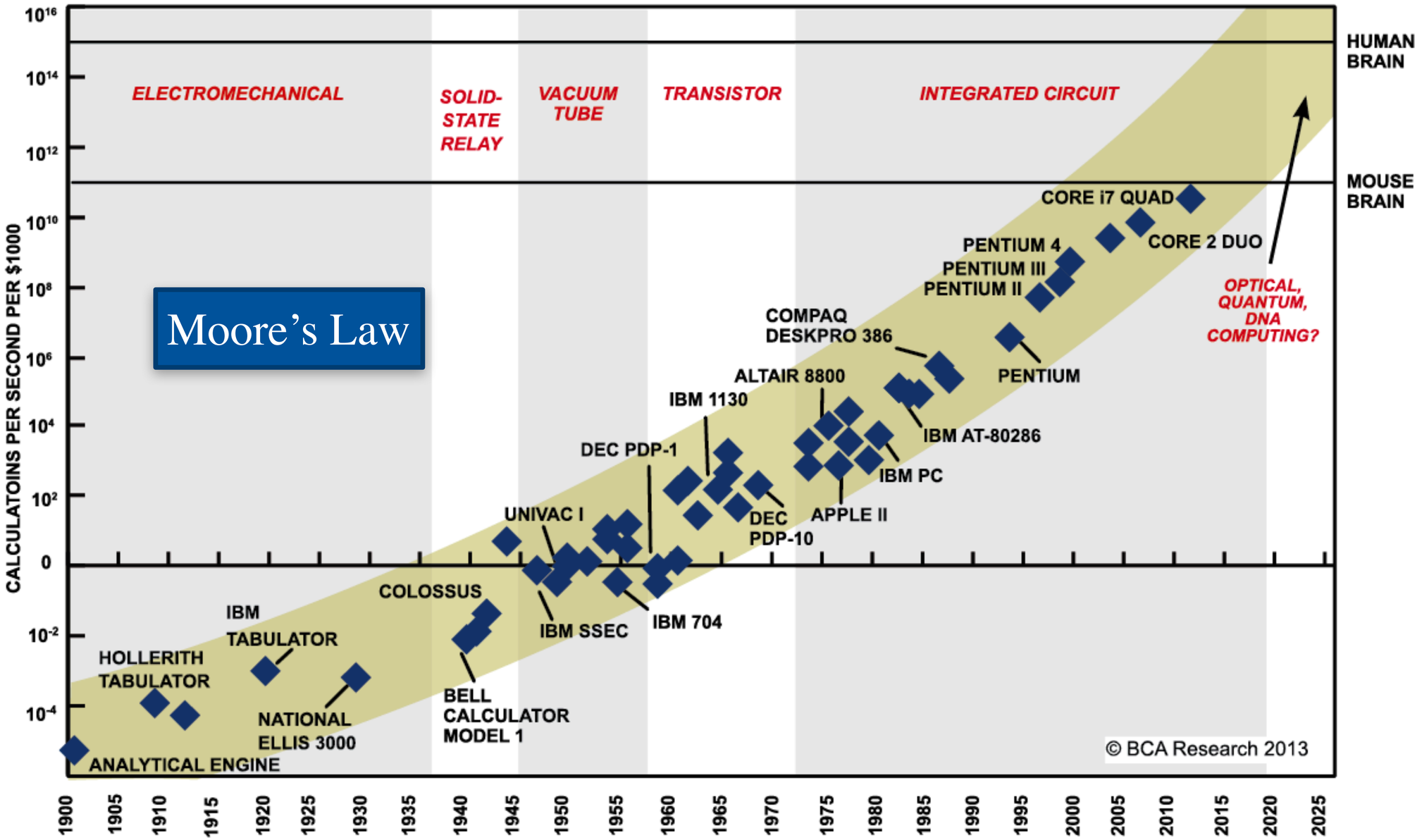
Extra Options

- Combined BS/MS
  - all degrees can be combined w/ MS
- CS Minor
  - Calc 2, Programming
  - Discrete, Comp Org, Data Structures, OS
  - eligible for Grad School in CE or CS

How to get started…

- COP 2800 or COP 3502
- Online tutorials, open courseware
- Clubs & Activities
  - Data Science Club
  - Hackathons
  - Software Clubs, and more!




Moore's Law
CALCULATOINS PER SECOND PER $1000
ELECTROMECHANICAL
SOLID-STATE RELAY
VACUUM TUBE
TRANSISTOR
INTEGRATED CIRCUIT
HUMAN BRAIN
MOUSE BRAIN
OPTICAL, QUANTUM, DNA COMPUTING?
CORE i7 QUAD
CORE 2 DUO
PENTIUM 4
PENTIUM III
PENTIUM II
PENTIUM
COMPAQ DESKPRO 386
ALTAIR 8800
IBM 1130
DEC PDP-1
IBM AT-80286
IBM PC
APPLE II
DEC PDP-10
UNIVAC I
IBM SSEC
IBM 704
COLOSSUS
BELL CALCULATOR MODEL 1
IBM TABULATOR
HOLLERITH TABULATOR
NATIONAL ELLIS 3000
ANALYTICAL ENGINE
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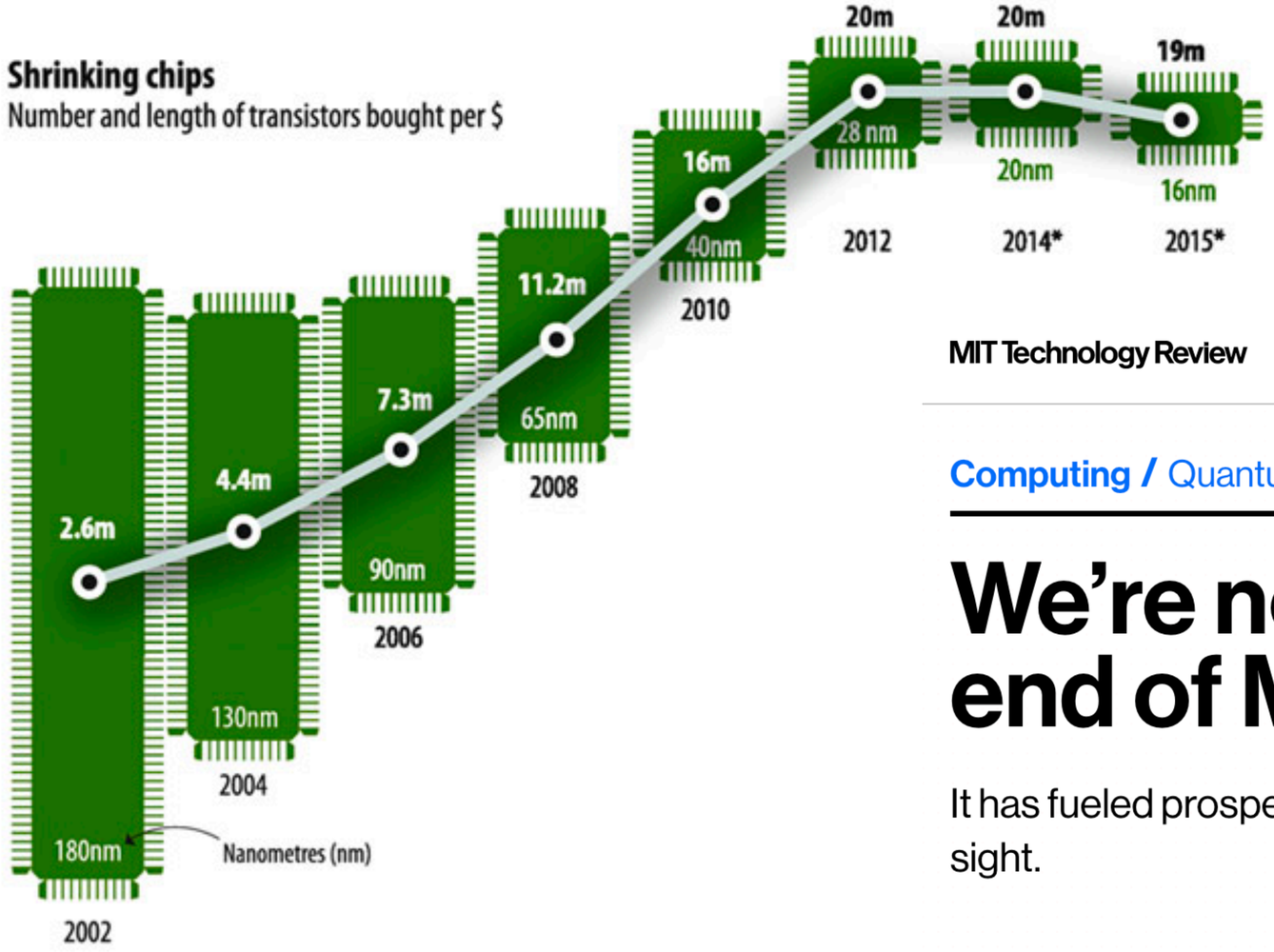


MIT Technology Review

Computing / Quantum computing

We're not prepared for the end of Moore's Law

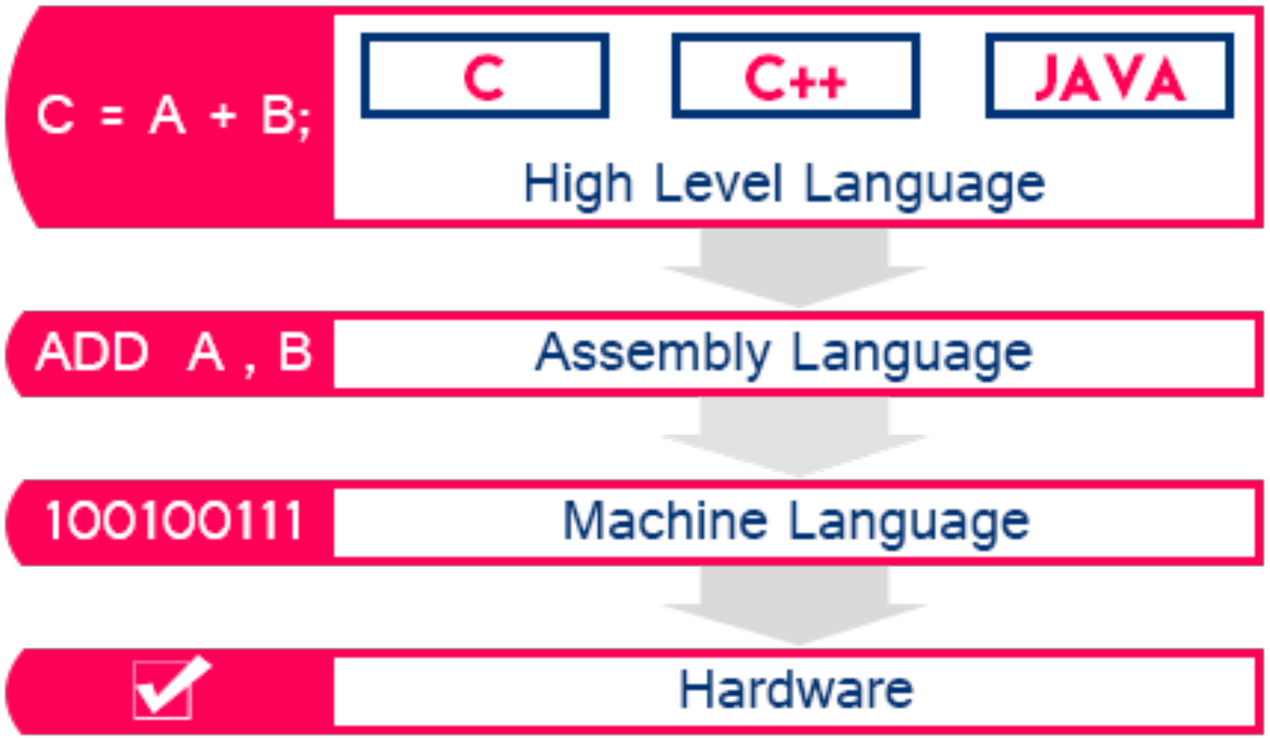
It has fueled prosperity of the last 50 years. But the end is now in sight.

by **David Rotman**

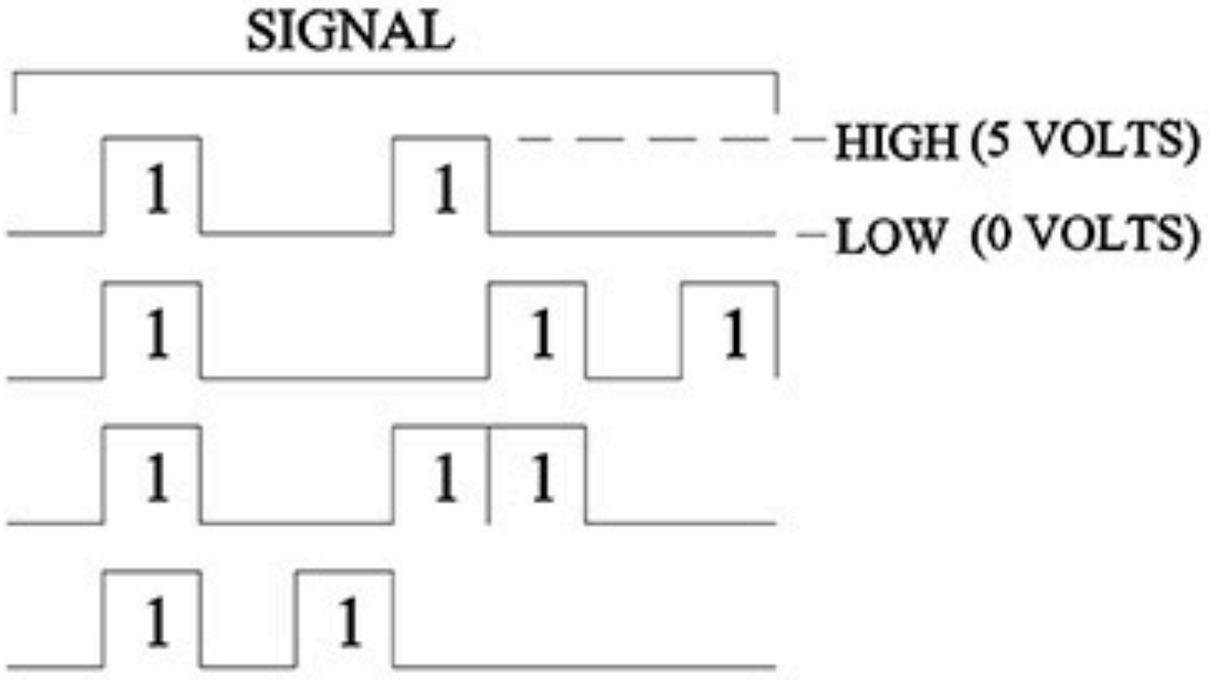
February 24, 2020

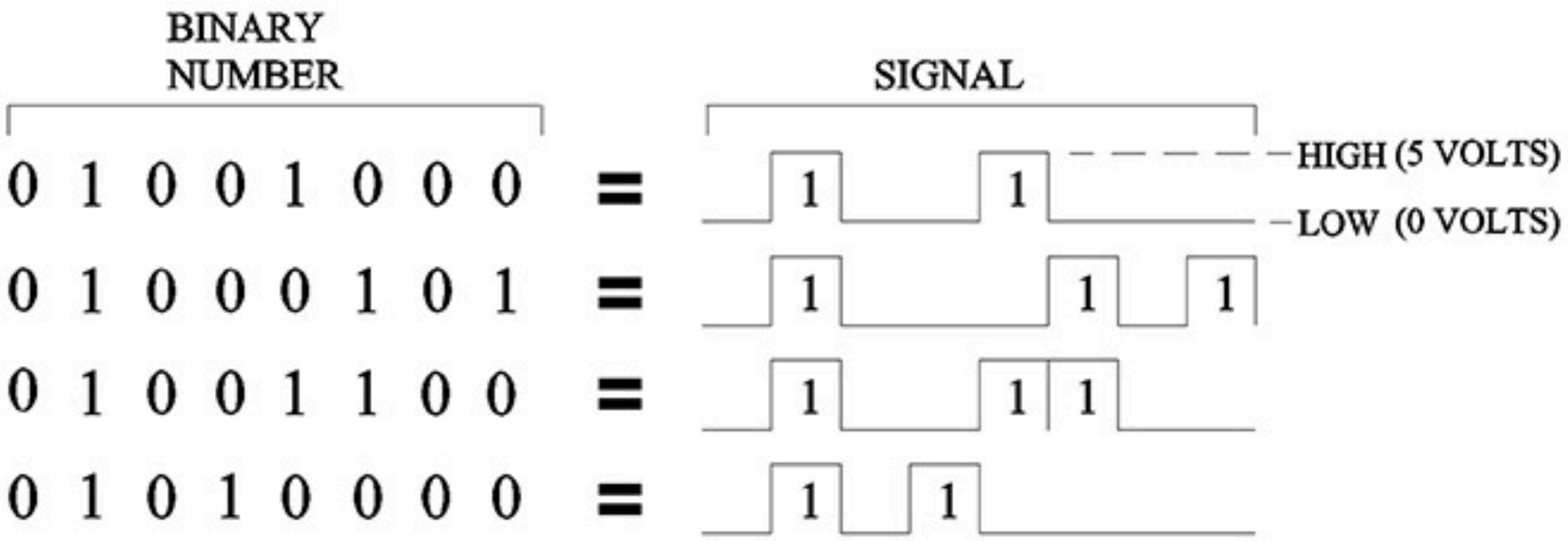
High Level Languages

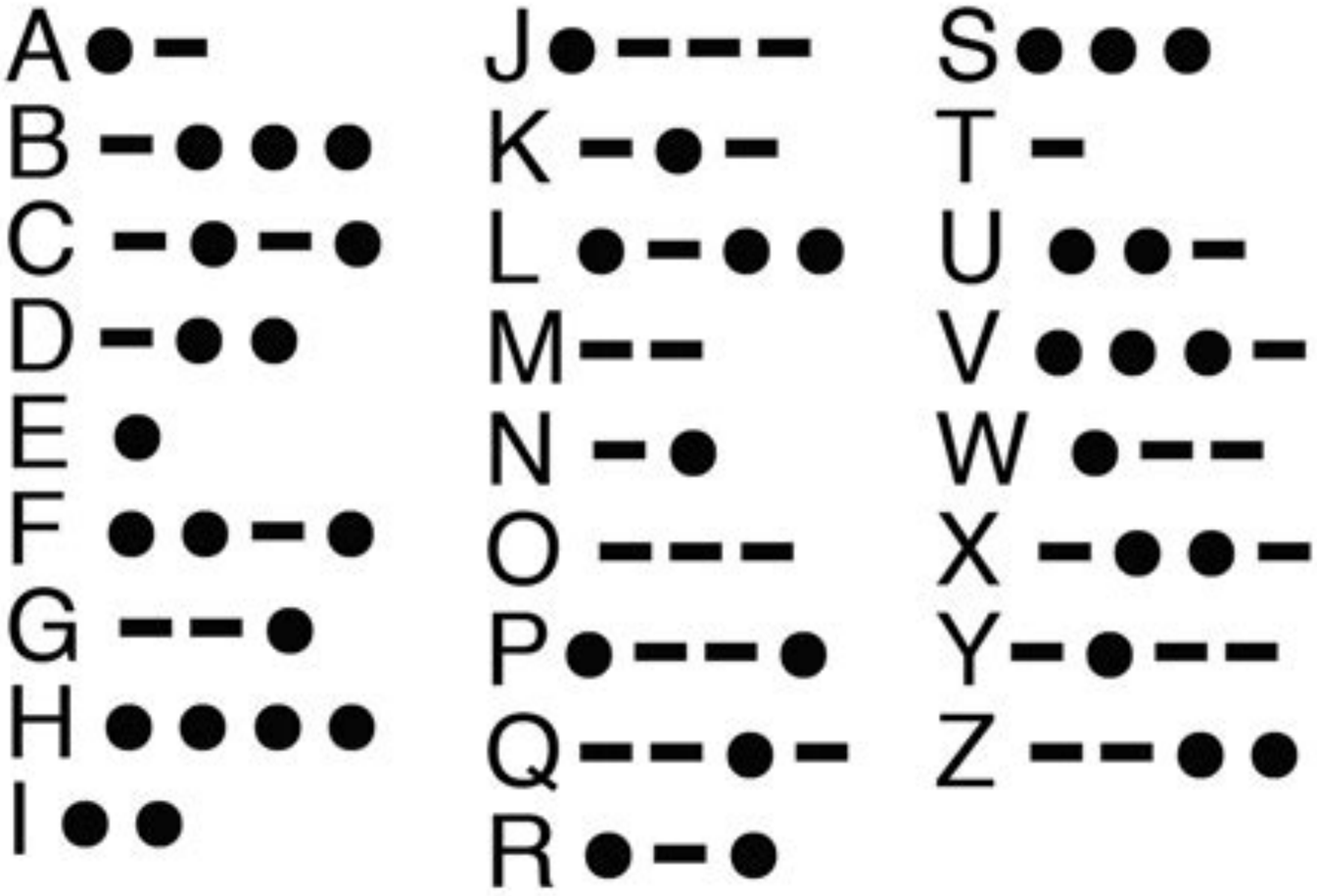
- Python:
  - beginner friendly
  - popular for data analysis
- Java
  - widely used
  - commonly taught
- C++
  - lower-level than Java
  - high performance



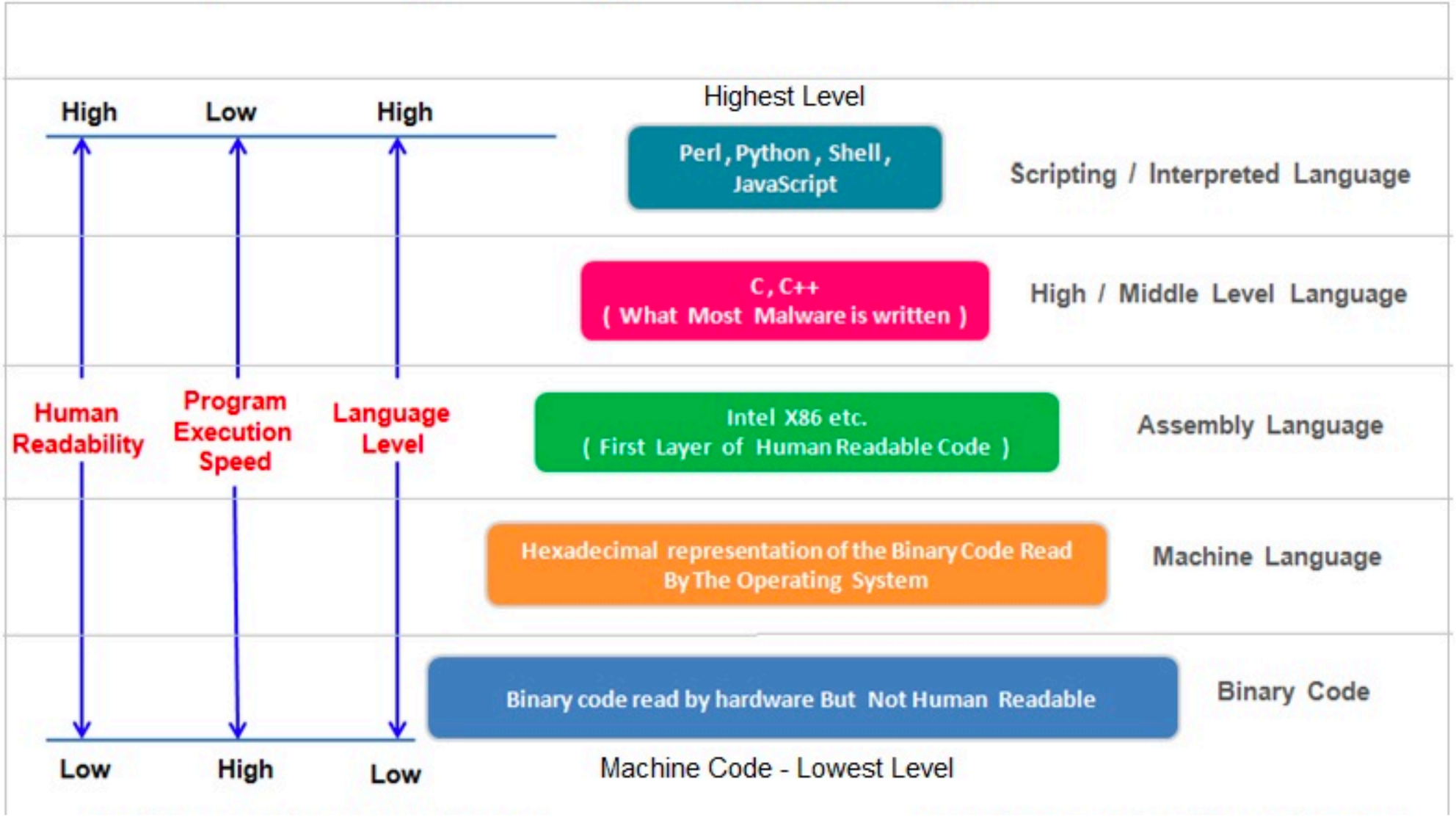
Python Code	Assembly Code	Machine Code
x = 1	lw $t0, 1	00000001000
y = 1	lw $t1, 1	01001010110
print (x + y)	add $t3,$t0,$t1	0000100000
	lw $v0,1	
	move $a0,$t3	
	syscall	


SIGNAL
HIGH (5 VOLTS)
LOW (0 VOLTS)
1
1
1
1
1
1
1
1
1
1


BINARY NUMBER
SIGNAL
0 1 0 0 1 0 0 0 =
0 1 0 0 0 1 0 1 =
0 1 0 0 1 1 0 0 =
0 1 0 1 0 0 0 0 =
HIGH (5 VOLTS)
LOW (0 VOLTS)
1
1
1
1
1
1
1
1
1
1


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

Computer Programming Language - Types And Levels

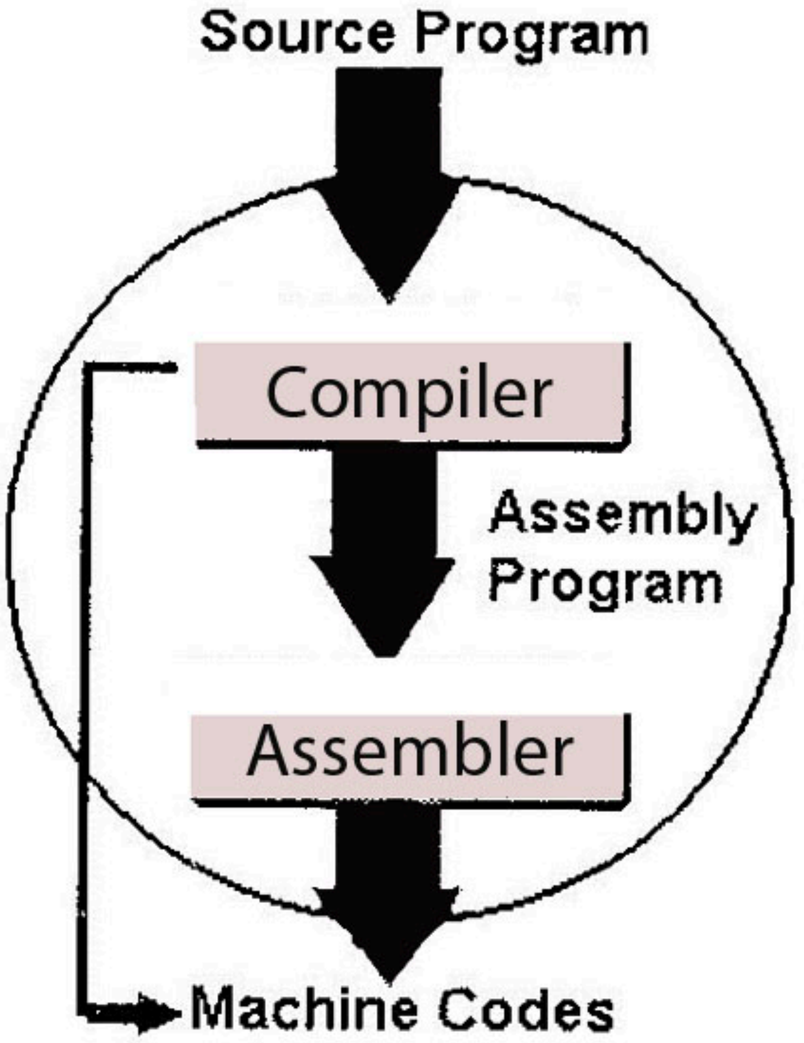


High Level Languages

- Python:
  - beginner friendly
  - popular for data analysis
- Java
  - widely used
  - commonly taught
- C++
  - lower-level than Java
  - high performance
- HTML, CSS, JavaScript
  - used for web design
- C#
  - used for Windows apps
  - Unity Game Engine
- Swift, Objective-C
  - Used for Apple iOS apps
- SQL
  - managing databases

Tools Needed

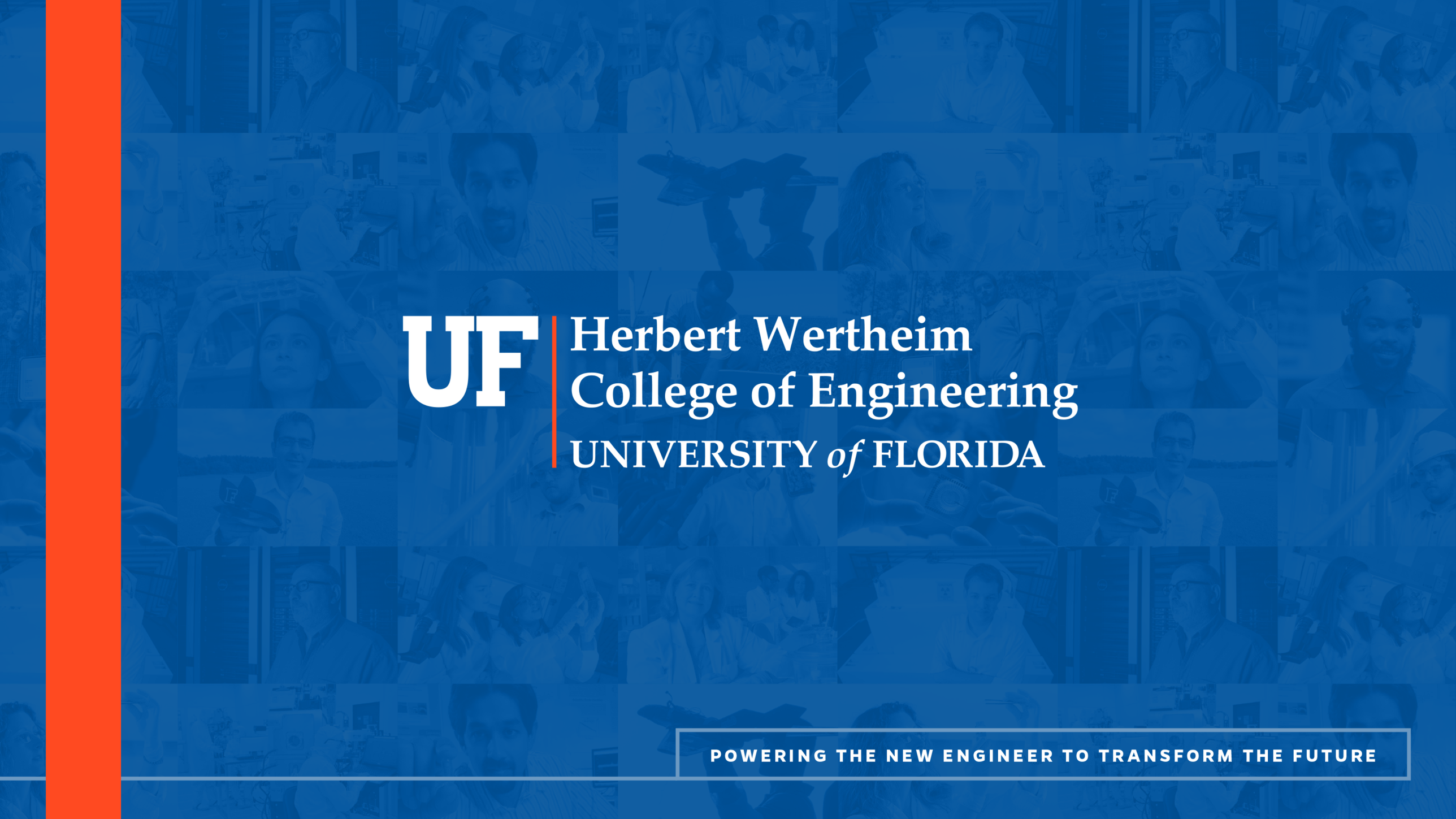
- Text Editor + Compiler:
  - good for learning
  - requires careful code check
- Integrated Dev. Env. (IDE)
  - good for fast development
  - debugger included



Check the Website:

www.cise.ufl.edu/~tarce/egs1006.html

Terek Arce
Email: tra04@ufl.edu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