SENG 300
Introduction to Software Engineering

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Winter 2020

Acknowledgement

- Some of the contents are adapted from material by Prof. Tim Lethbridge and Prof. Tony Tang

Today

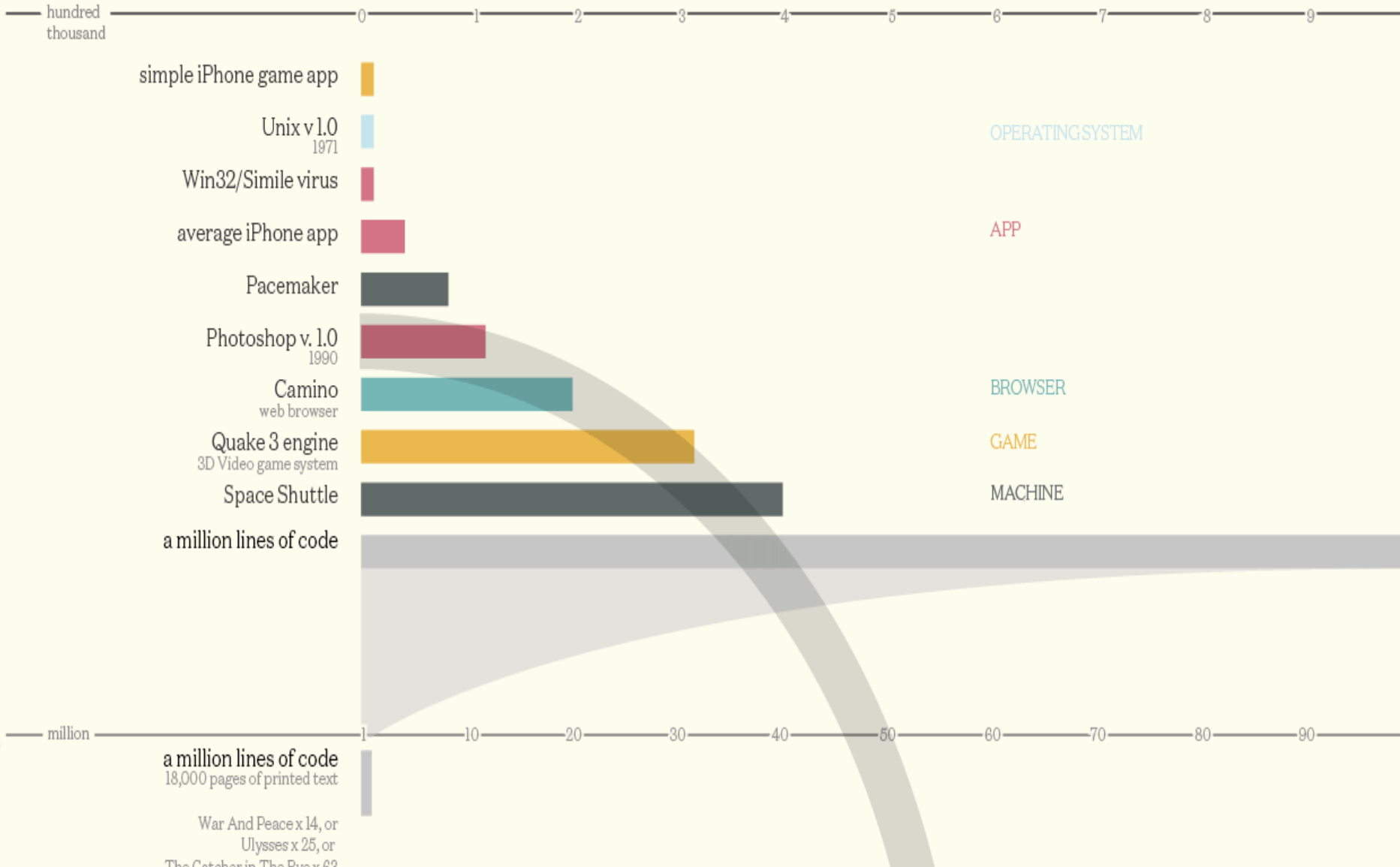
- What is Software Engineering?
- Why Software Engineering?
- Course Information

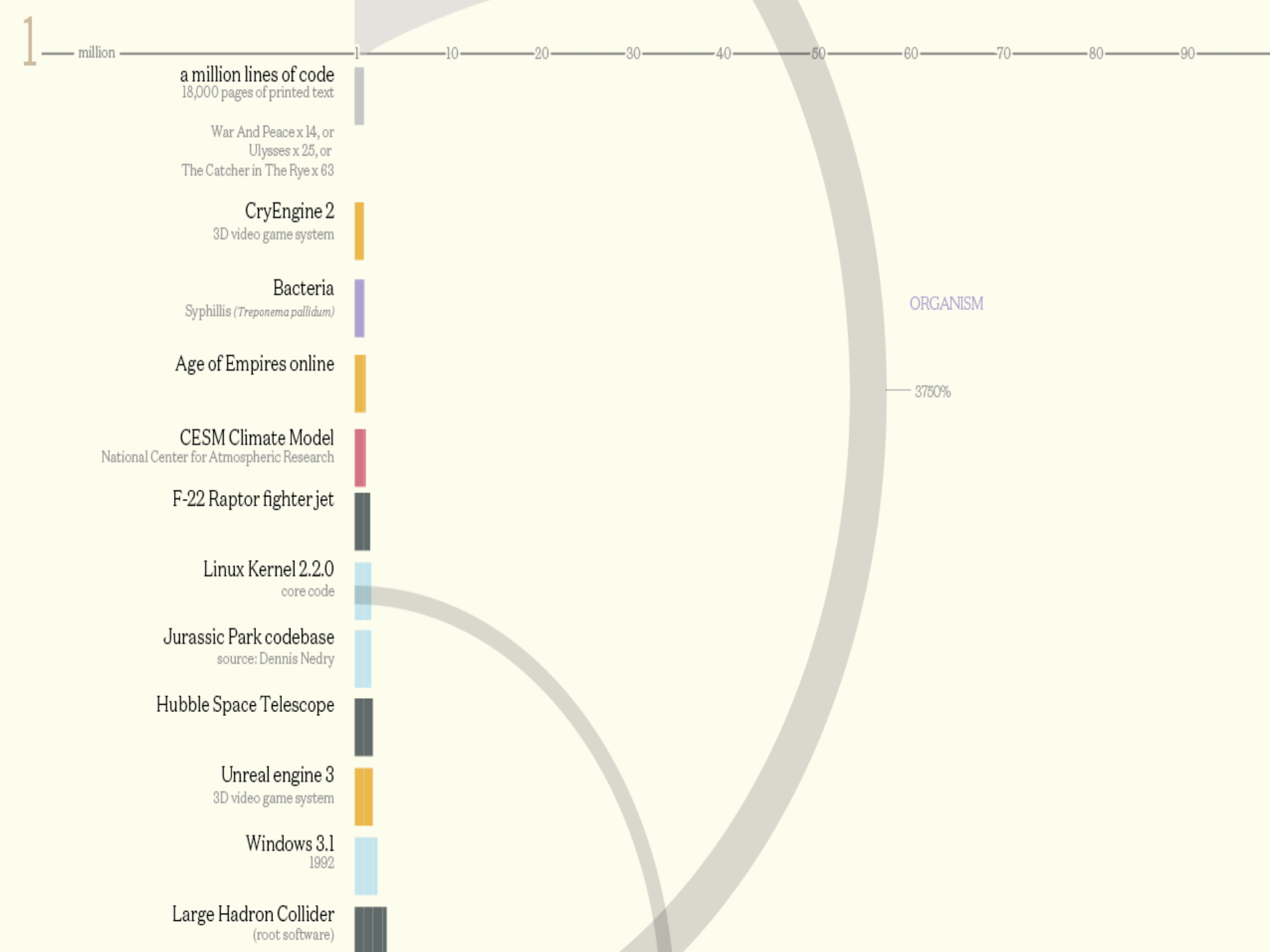
A Question

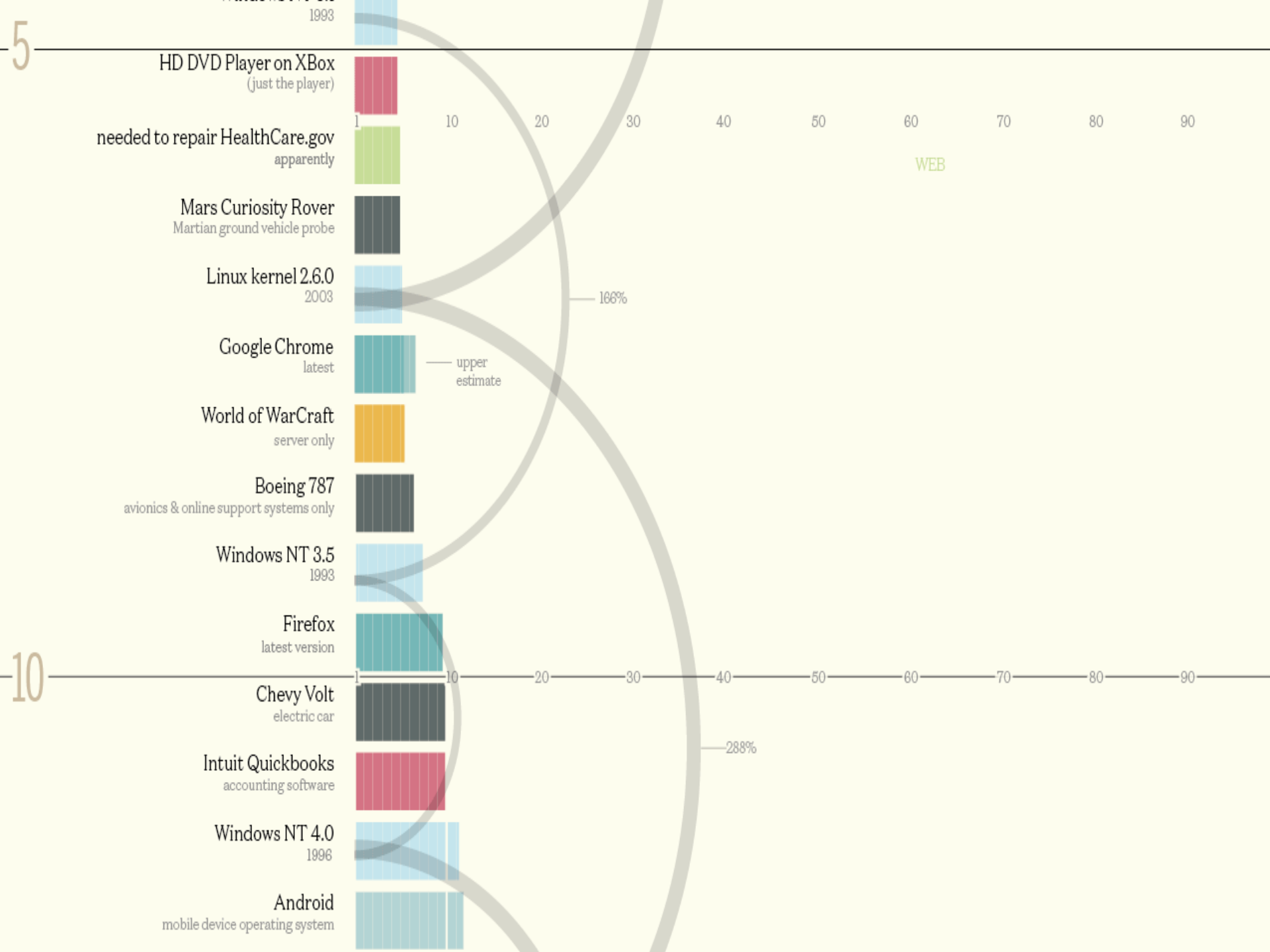
- What's the largest piece of software you've interacted with?

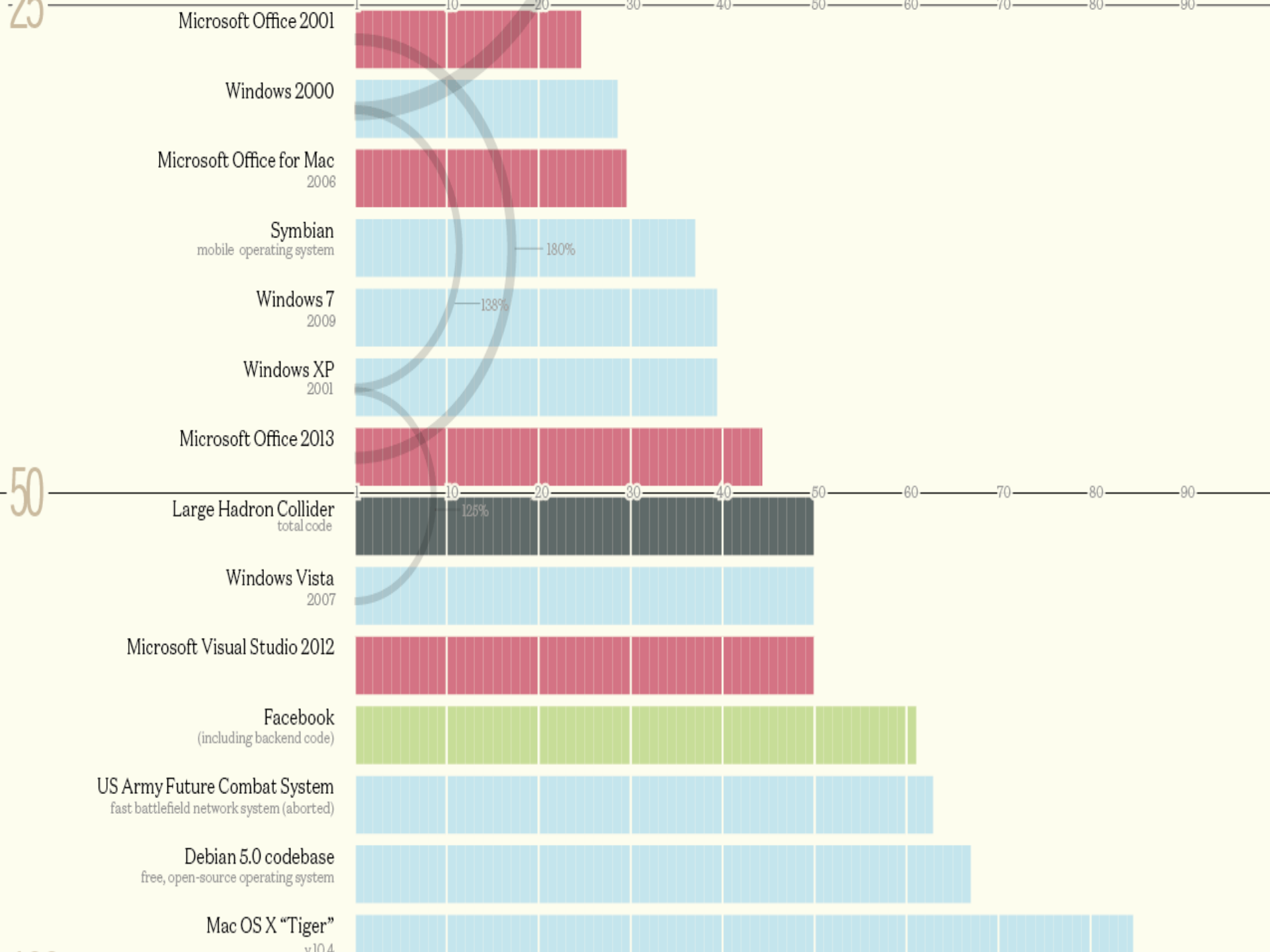
Codebases

Millions of lines of code



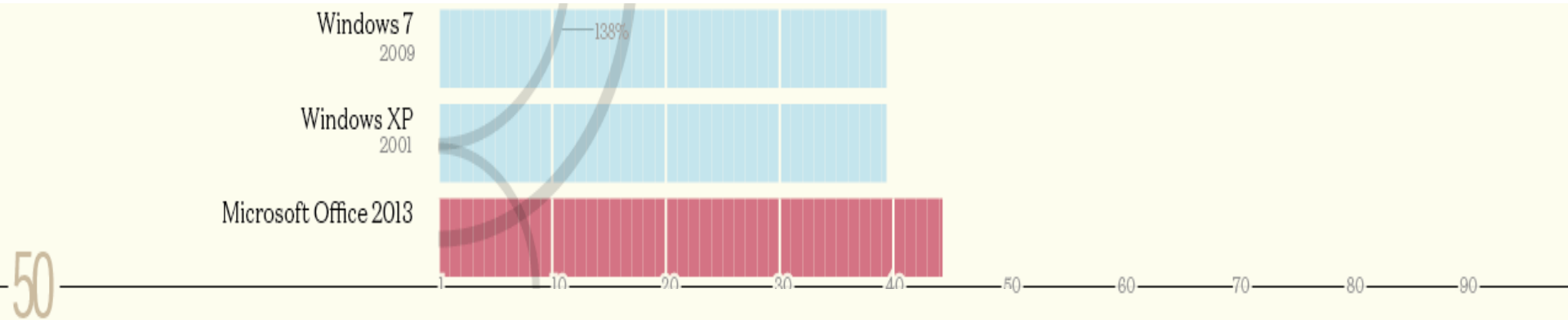

1
million
1
10
20
30
40
50
60
70
80
90
a million lines of code
18,000 pages of printed text
War And Peace x 14, or
Ulysses x 25, or
The Catcher in The Rye x 63
CryEngine 2
3D video game system
Bacteria
Syphillis (Treponema pallidum)
Age of Empires online
CESM Climate Model
National Center for Atmospheric Research
F-22 Raptor fighter jet
Linux Kernel 2.2.0
core code
Jurassic Park codebase
source: Dennis Nedry
Hubble Space Telescope
Unreal engine 3
3D video game system
Windows 3.1
1992
Large Hadron Collider
(root software)
ORGANISM
3750%


1993
5
HD DVD Player on XBox
(just the player)
1
10
20
30
40
50
60
70
80
90
needed to repair HealthCare.gov
apparently
WEB
Mars Curiosity Rover
Martian ground vehicle probe
Linux kernel 2.6.0
2003
166%
Google Chrome
latest
upper
estimate
World of WarCraft
server only
Boeing 787
avionics & online support systems only
Windows NT 3.5
1993
Firefox
latest version
10
Chevy Volt
electric car
288%
Intuit Quickbooks
accounting software
Windows NT 4.0
1996
Android
mobile device operating system


25
1
10
20
30
40
50
60
70
80
90
Microsoft Office 2001
Windows 2000
Microsoft Office for Mac
2006
Symbian
mobile operating system
180%
Windows 7
2009
138%
Windows XP
2001
Microsoft Office 2013
50
Large Hadron Collider
total code
125%
Windows Vista
2007
Microsoft Visual Studio 2012
Facebook
(including backend code)
US Army Future Combat System
fast battlefield network system (aborted)
Debian 5.0 codebase
free, open-source operating system
Mac OS X "Tiger"

Your code vs. Windows XP: how does it differ?

- Size
- Complexity
- Functionality
- Size of team building it
- How many times it is run?
- How many people use it?
- How long it is supposed to run for?
- Competing goals from customers?
- Change (faster machines, expectations, new hardware, new software)



Software Crisis

- A Historical Perspective (1950's)
  - Development of complex applications due to cheaper hardware.
  - Lack of tools and technologies resulted in
    - Prolonged schedule
    - Unreliable software systems
    - Disappointment !!!

Software was in Crisis

The Birth of Software Engineering

- Born in 1960 in a conference on Software Crisis
  - NATO software engineering conferences in 1968-1969
- Software crisis resulted in realization that:

"Coding" alone was not enough!!

New techniques and methods were required to control the complexity inherent in "LARGE" software systems

https://people.inf.ethz.ch/wirth/Miscellaneous/IEEE-Annals.pdf

The Birth of Software Engineering…

- Decision

  There should be some engineering principles applied for the development of successful software

The Term ‘Software Engineering’ was coined 50 years old

Software Engineering-Definition

IEEE

The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software

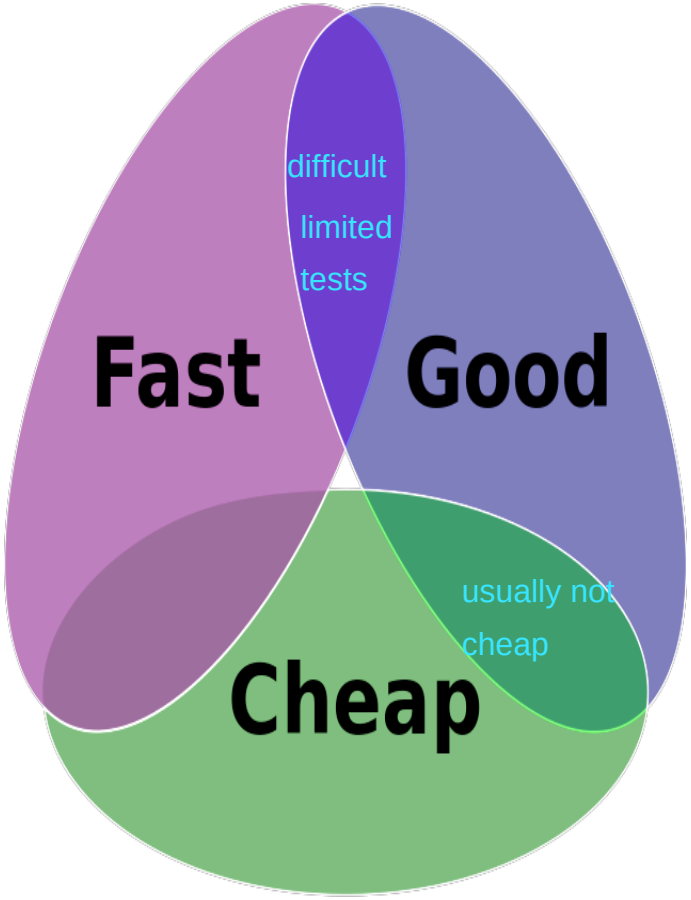
Why Software Engineering/course matters?

- For IT projects, a 2004 industry study by the Standish Group found an average cost overrun of 43 percent; 71 percent of projects came in over budget, exceeded time estimates, and had estimated too narrow a scope; and total waste was estimated at $55 billion per year in the US alone.

https://www.projectsmart.co.uk/white-papers/chaos-report.pdf

Why is this class important?

- Real-life software development is messy ex) client changes the requirement
- You can't get everything perfect: cost, external factors, etc.
- Engineering isn't an algorithm-- instead, here are some processes you can follow that are considered "best practice"
- Or, at least, you'll know what they were before you started your job



Course Information

Teaching Staff

- Sohaib Shahid Bajwa (Instructor)
  - Office ICT 708
  - Office hours: TR (14:00 to 15:00) or by email appointment
  - sohaib.bajwa1@ucalgary.ca
  - Subject line:
    - Write SENG 300 L01/L02 while contacting
- Teaching Assistants
  - TBA

Course material

- Course web site
  - D2L: SENG 300 L01 and L02 - (Winter 2020)- Introduction to Software Engineering

- Recommended textbooks
  - Roger S. Pressman and Bruce R. Maxim. *Software Engineering: A Practitioner's Approach*. McGraw Hill, 9th edition

Assessments

- Individual Quizzes – 25%
- Individual Assignments – 15%
- Individual Lab Exercises – 5%
- Group Project – 25%
- Final Exam - 30%
  - The course has a registrar schedule final exam.

Assessments – Quizzes (25%)

- Quiz on every Tuesday
  - No quiz in first and last week
- Total Quizzes
  - 11 (9 highest quizzes would be counted.)
- Duration
  - Approximately 15 minutes
- Pattern
  - Multiple Choice Questions, Fill in the Blanks, Short questions or a combination of those
- Would upload pattern and contents on course website on Friday
  - Generally speaking, whatever we have covered in the previous lecture
- Contact instructor if you have an extended absence

Assessments - Assignments (15%)

- Individual Assignments – 15%

- Assignment 01
  - Understanding Requirements
- Assignment 02
  - Object-oriented analysis and design - class diagram etc.
- Assignment 03
  - Software Quality Assurance - Code inspection
- Assignment 04
  - Software measurement

Assessments - Lab Skills (5%)

- Demonstrate the ability to use software tools
- Eclipse Debugger
- GitHub
- Slack
- Trello/Asana
- …

Assessments – Projects (25%)

- 5 person in a team
  - Instructor would make teams
  - Instructor would assign project
  - You can make your own team
    - All must be in same tutorial
    - Remember: Best friends don't make good teams.
- Team may have their own project ideas
  - Generally not suggested as difficult to implement a customer role
  - Must approve from instructor

Assessments – Final Exam (30%)

- The course will have a registrar schedule final exam.
- Date: TBA

Class Participation

- Bonus will be awarded based on class participation.
- Class participation includes
  - TopHat
  - Worksheets
  - In class exercises

- Example: You have received overall marks 88.80
  - Should it be an A or A-?
  - It is determined based on class participation.

Academic misconduct

- You should not look or submit solutions to the assignment problems that does not belong to you.
- You are required to cite all sources of information that you use.
- Don’t share your solution neither ask student to share their solution.
- You may talk to each other about assignments, but you must write up your answer individually.
- Academic misconduct is taken very seriously. You can be expel from the university.
- If you provide course material to websites, that is also considered as an academic misconduct.
- See misconduct in your course outline for more details

Class room rules

- Lecture
  - Lots of interactive discussions during the lecture
  - Class exercises
    - Individual and in team
- If a person whispers, it's a whisper.
  - What if everyone is whispering?
    - it's a noise, avoid that.
- If you are not interested in the lecture, you can simply leave. I have no issue.
- Any other?

Class Representatives

- Need 4 volunteer
- You are committed only to have short meetings (5 minutes) on every Thursday after the class
- Your tasks:
  - tell me how I am doing
  - provide me with feedback
  - be a liaison for other students

Sohaib Shahid Bajwa (PhD)
Call me Sohaib

- Watching Movies
- Enthusiastic traveler
- Other:
  - Research and teaching
  - Software Engineering in startup companies

Introduce yourself

- Short introductory pitch in 20 seconds
- Name?
- Favorite area in Computer Science (if any)
- One favorite thing outside academic (if any)