CSCI 136:
Data Structures
and
Advanced Programming

Lecture 1

Welcome

Instructor: Dan Barowy

Williams

Please stop me to ask questions!

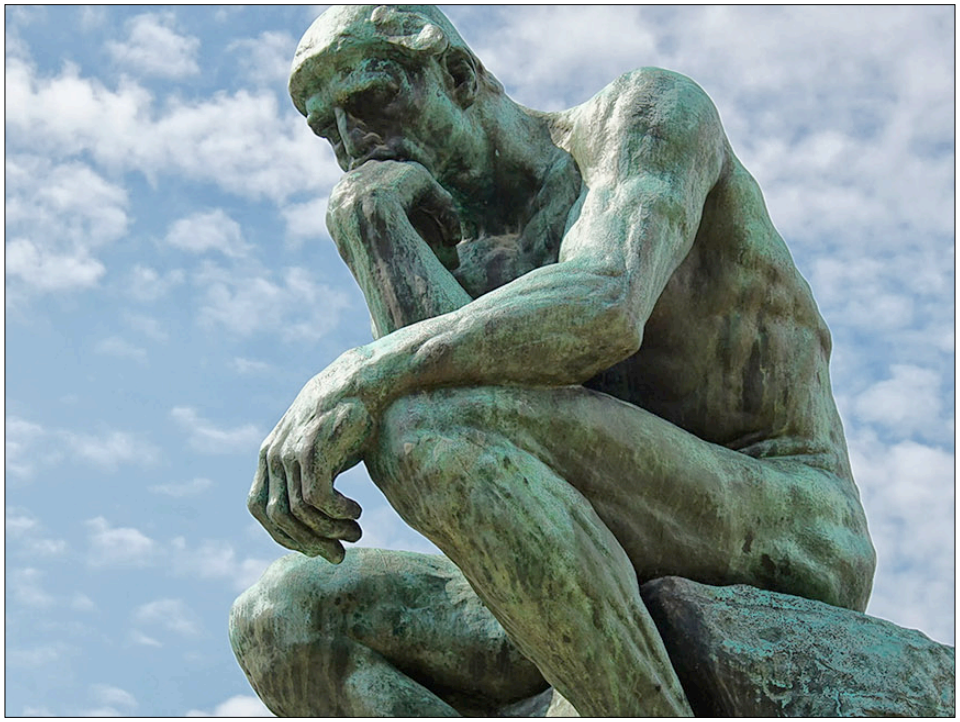
Toyota Production System

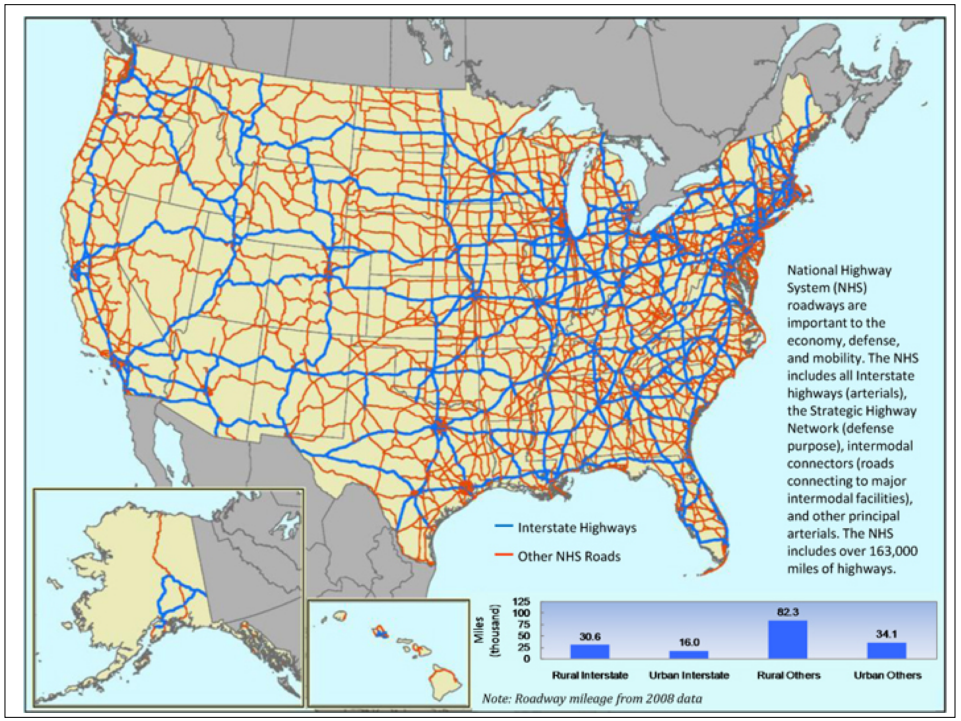
Any worker can stop the line!

Toyota Production System

Stop me if you feel like something is missing!

About me





By avoiding left turns whenever possible, UPS estimates to save:

10 million
gallons of fuel a year

6 to 8 fewer miles driven per route

100,000
metric tons of CO_2 emissions a year

(equivalent to **21,000** cars taken off the road)

Source: UPS estimates for 2016, related to the deployment of the ORION routing system on US routes.

A study on crash factors in intersection-related accidents from the US National Highway Traffic Safety Association shows that turning left is one of the leading "critical pre-crash events" … About 61 percent of crashes that occur while turning or crossing an intersection involve left turns, as opposed to just 3.1 percent involving right turns.

source: cnn.com

Finding Shortest Paths

Data: road segments

- road segment: (source, destination, length)

Input: source, destination

Output: shortest path

- path: (segment$_1$, …, segment$_n$)

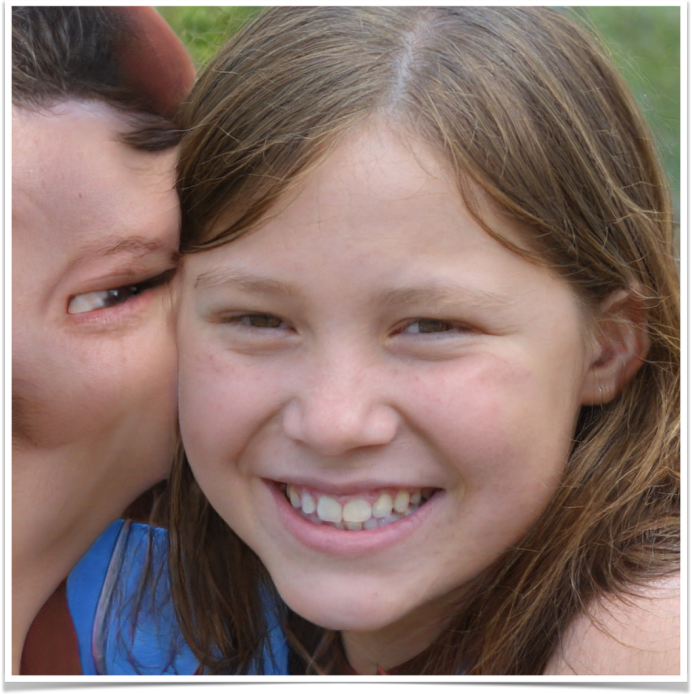
The Algorithm: Dijkstra's Algorithm

Data structures:

- graph: essential representation of a "road network"
- priority queue: ordered set of next roads to try
- also uses: lists, arrays, stacks, …

Demo

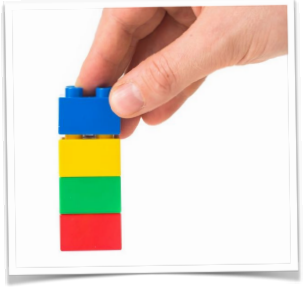
StyleGAN2



You already know how to program.

This course is about: “good” programs




Prof. Dan


Prof. Sam


Lab instructor: Lida Doret (’02)


Jon


Maddy


Kit


Harry


Jenn


Saul


Nolan


Evelyn


Samuel

Chris


Max

Outline

1. ~~Course preview~~
2. Course bureaucracy
3. Pre-lab due Thursday
4. Java refresher

Administrivia

- Class roster: Who's here?
  - And who's trying to get in?
- "Handout": Class syllabus
- Lecture location: Schow 030B
- Lab:

  Thur 9:55-11:10am (sec 4),

  Thur 1:10-2:25pm (sec 5 & 7),

  Thur 2:35-3:50pm (sec 6 & 8)

  (please go to assigned lab!)
- Lab locations: TCL 216 & 217a (to be posted soon)

Administrivia

- Lab entry code: 3-9-27-81 (quick, memorize this!)
- Course Webpage:

  https://www.cs.williams.edu/~cs136

Course webpage!

https://www.cs.williams.edu/~cs136

Syllabus

How to contact us

Section 1 Instructor	Prof. Daniel Barowy
Office	TCL 307
Email	dbarowy@cs.williams.edu
Section 2 & 3 Instructor	Prof. Samuel McCauley
Office	TCL 306
Email	sam@cs.williams.edu
Lab Instructor	Lida Doret
Office	TCL 205
Email	lpd2@williams.edu
Lectures	MWF 9:00-9:50am (Section 1; Barowy) in Schow 30b MWF 10:00-10:50am (Section 2; McCauley) in Schow 30b MWF 11:00-11:50am (Section 3; McCauley) in Schow 30b
Labs	Th 9:55–11:10am, 1:10–2:25pm, 2:35–3:50pm (Due Tuesday before 10pm)
Web Page	`https://www.cs.williams.edu/~cs136`

Course textbook

Java Structures

Data Structures in Java for the Principled Programmer

The $\sqrt{7}$ Edition

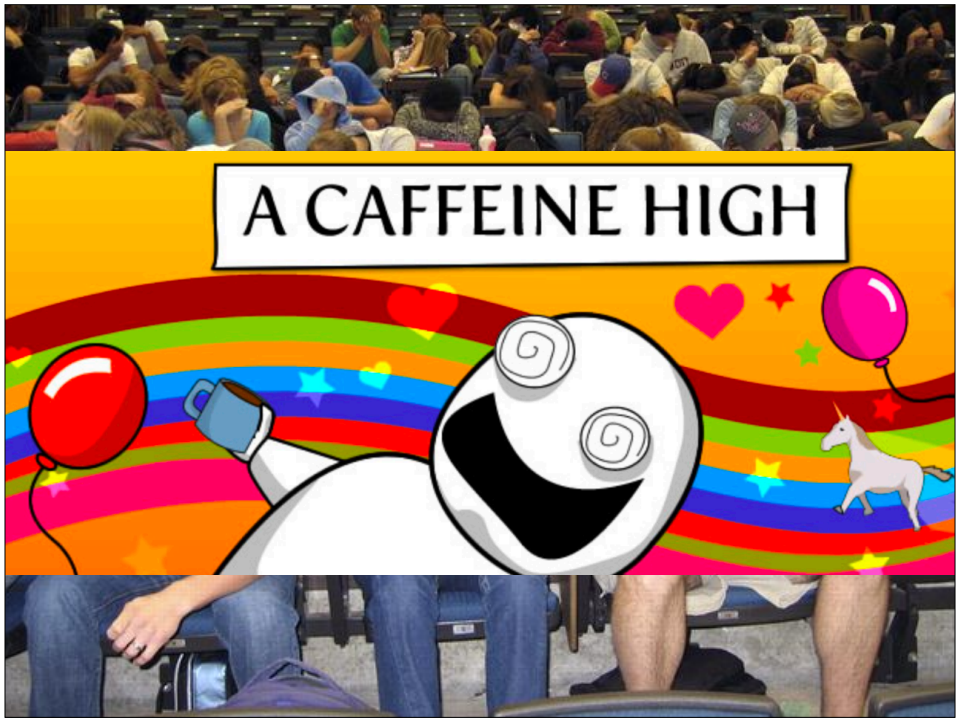
(Software release 33)

Duane A. Bailey

Williams College
September 2007

Tips for success

- Come to lab and lecture **on time**
- Read assigned material **before class** and lab
- **Bring paper/pencil** to lab for brain-storming, …
- **Come to lab prepared**
- Bring **design docs** for program
- 1 Prof + 1TA == **help** for you: take advantage of this
- **Ask questions!**
- Your work should be **your own**. Unsure? Ask!
- **Participate**



Weekly activities

- Reading the **text**: 12-15 pages, on average, per lecture
- Preparing for **weekly quizzes**
- **Preparing for** the weekly programming labs
- **Completing** the weekly labs

Yes, quizzes

- **Two quizzes** per week.
- The first quiz (usually on Monday) is a "**practice**" quiz.
- The second quiz (usually on Friday) is the **real** quiz.
- **Prepare for quizzes by doing the reading.**
- No make-up quizzes.

Lab Assignments

- Assigned: Tuesday
- Lab Meeting: Thursday
- Pre-lab: sometimes work due *before* Thursday
- Due: Tuesday no later than 10pm

Assignments submitted using GitLab

GitLab

Late Days

- **3 late days total**
  - A “late day” means that you can submit an assignment one day later
- You must tell us that you are using a late day, otherwise your assignment will be sent to the graders as-is.
  - https://bit.ly/3GtyP8S
- You may use up to two late days on a single assignment.
- Use these wisely.

Resubmissions

- No late assignments allowed in this course.
- 2 resubmissions allowed.
- For all assignments except last lab and final exam.
- Yes, you may resubmit your midterm.
- Gain up to 50% of points back.
- *You cannot resubmit an unsubmitted assignment!*
- Due by the end of the semester.
- See syllabus for instructions.
- Use them wisely.

Accounts and Passwords

- If you’ve taken 134, you probably do not need to do this.

Otherwise…

- Mandatory: Before the first lab
- Talk to Mary Bailey about your CS account
- Her office is in the 3rd floor CS lab (TCL 312)
- Get this sorted out **before** lab on Wednesday!

Honor Code

We take this seriously.

It is much better to reach out to me, Sam, or Lida when you’re having difficulties than it is to copy someone else’s work.

It is much better to get partial credit than it is to copy someone else’s work.

There is never a penalty for asking for help.

We know when you copy work.

The consequences are severe.

Most problems can be avoided with planning.

Homework for Thursday

Homework for Thursday

PRE-LAB: Design Documents

Read through this lab handout and sketch out a design for your Silver Dollar Game program. You should use the sample Dice Design Document as a guide. Each week your design document will account for a small portion of your lab grade, so please bring it to lab, be prepared to discuss it with a partner, and be prepared to submit it. For the first lab, it is OK if the design is rough: we are not going to deduct points for correctness. The purpose is to ensure that you think about the lab in advance.

Homework for Monday

Read the syllabus.

There will be a quiz on the syllabus.

Homework for Monday

To refresh your memory about Java, read the "Java for Python Programmers" handout.

Recap & Next Week

Today:

- What this course is about.
- Course policy.

Next class:

- Java!
- Program design
- Our first data structure