CS251:
Data Structures and Algorithms

Spring 2019

Daniel G. Aliaga

This Course

- This course covers basic data structures and algorithms in Computer Science.
- Knowledge and understanding of these data structures and algorithms is fundamental to your success in Computer Science.
- You will find there is much more to Computer Science than “just programming”; the sooner you learn to program well and understand the fundamentals, the sooner you can solve fascinating problems!

Who am I?

- Daniel G. Aliaga

  http://www.cs.purdue.edu/~aliaga and aliaga@cs.purdue.edu

  Associate Professor of CS doing Graphics

  Doctorate in Graphics

  Master's in Graphics

  Bachelors in Graphics

  High School Degree doing graphics/robots/science

  1980 (TRS80 Model I)

  Then: http://www.youtube.com/watch?v=3yuqdC8Id48)

  http://thinkingscifi.files.wordpress.com/2012/12/starwars-graphics.png

  Now: https://www.youtube.com/watch?v=WDkg3h8PCVU

- CGVLAB

  http://www.cs.purdue.edu/cgvlab

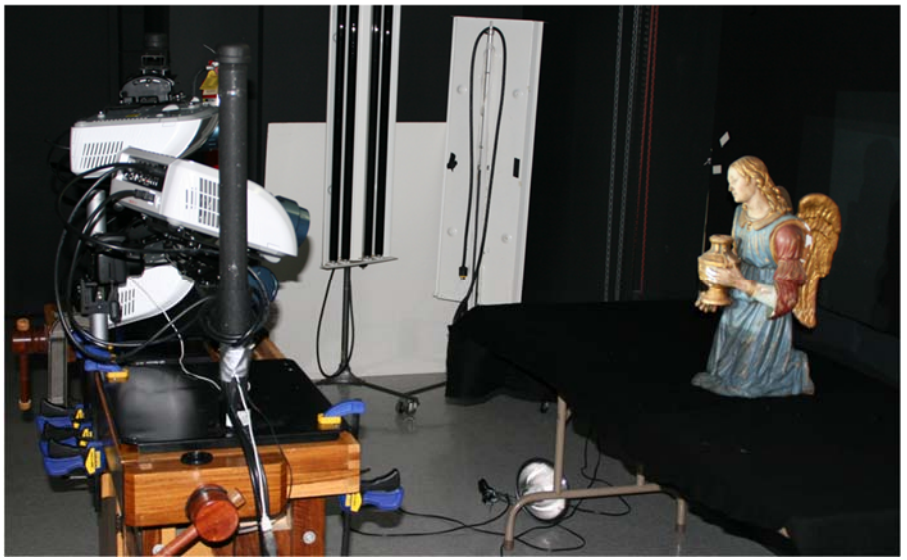
Videos…

- Graphics then:
  - http://www.youtube.com/watch?v=TbV7loKp69s
- Graphics now:
  - https://www.youtube.com/watch?v=t952yS8tcg8
- Difference?
  - Use of computers, data structures, algorithms…
  - (both have “art”…)

Spatially Augmented Reality

- Renaissance angel: 16th century (Giovanni della Robbia)

front view



side view

Spatially Augmented Reality

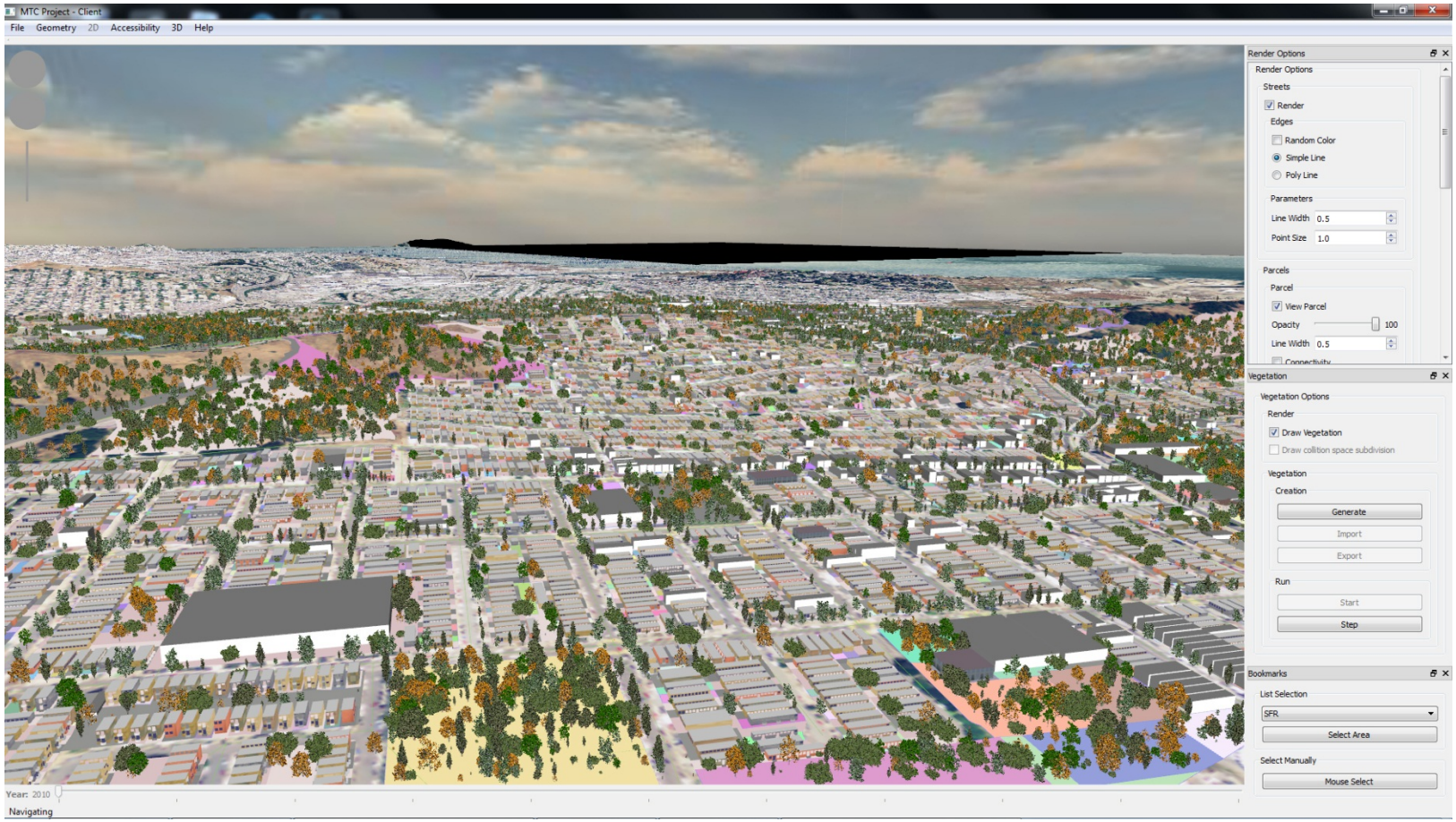
- Renaissance angel: 16th century (Giovanni della Robbia)

photo of
original object

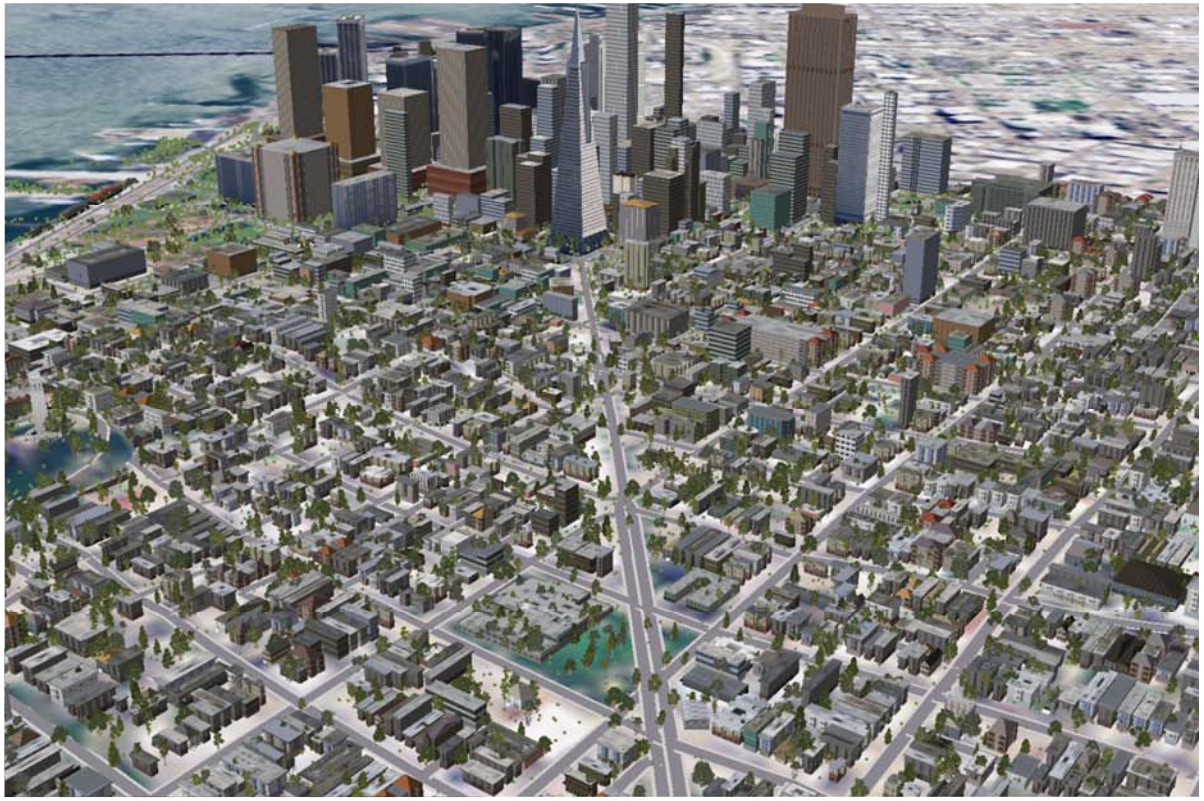
image of synthetic
restoration

photo of visually
compensated object

3D Urban Design and Planning



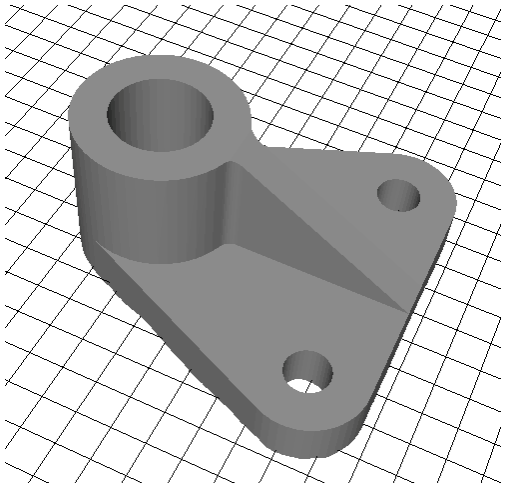
Google Earth



Our System

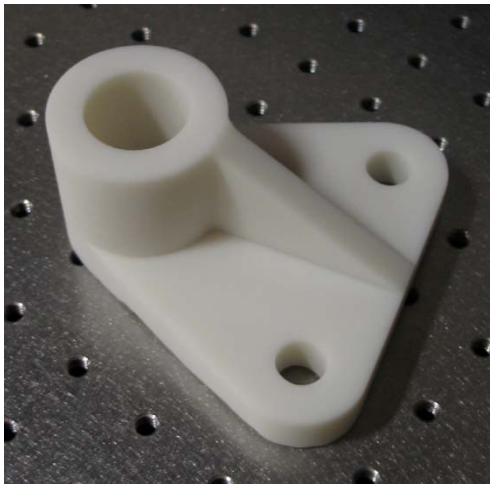
Our objective is *not* to precisely recreate a current city, but to enable urban planning scenarios with a similar degree of visual realism

3D Design and Manufacturing

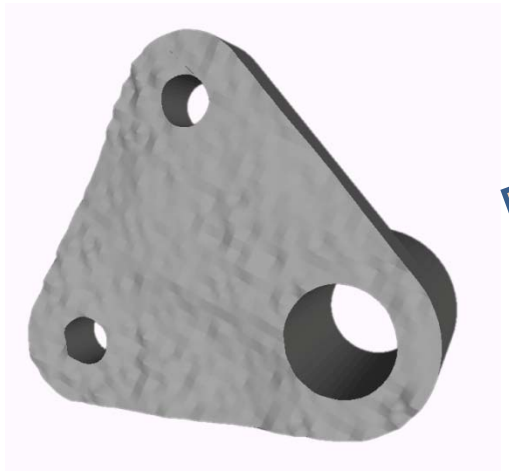


Designed 3D Model

Does designed = physical object?



Physical Object



Designed Signature

Acquired Fragment

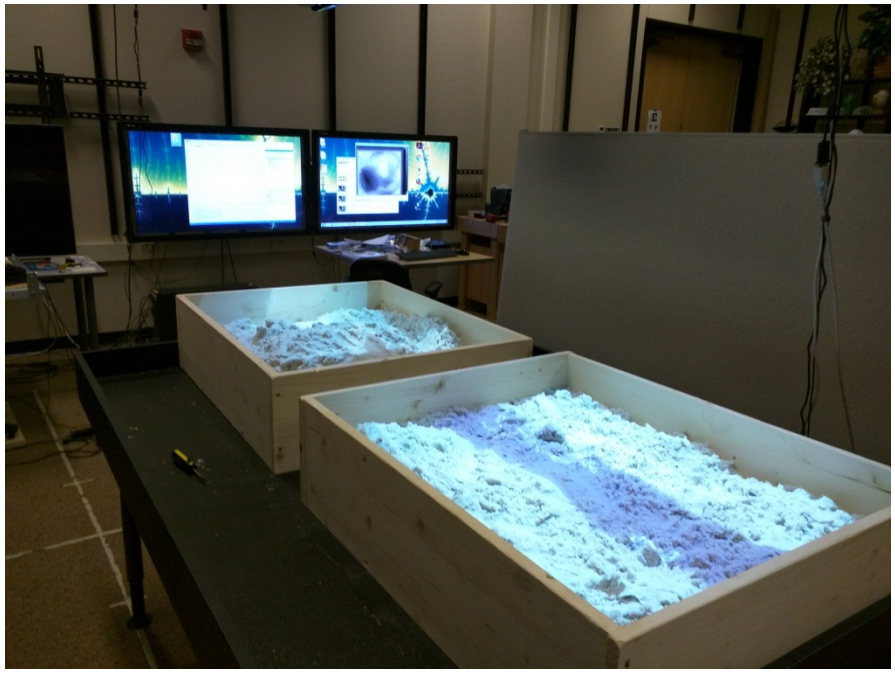
Physical Signature

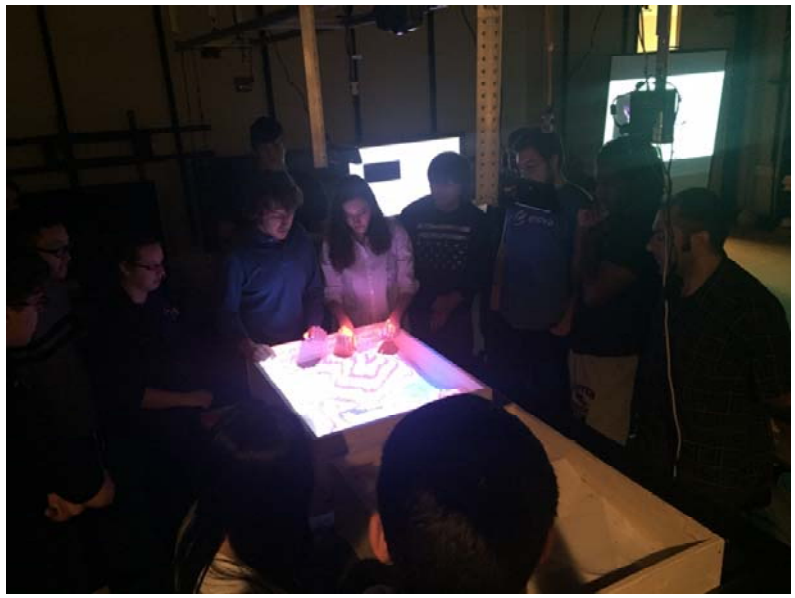
CS334
Fundamentals of Computer Graphics

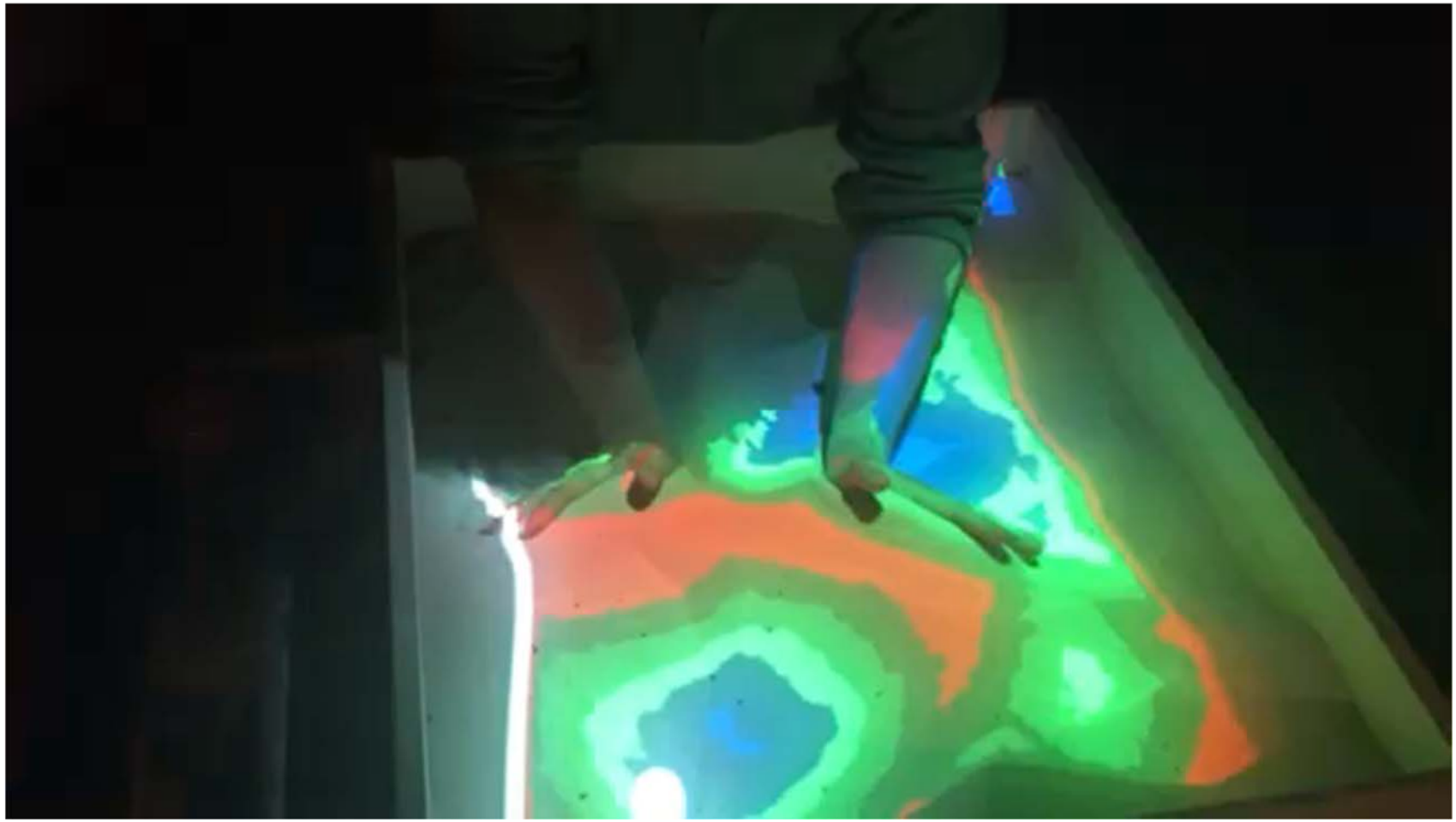
- Interested in computer graphics, virtual reality, architecture, games? Does modeling objects interest you? Do you like rendering photorealistic imagery? Is doing animations fun to you? All this is part of computer graphics.

CS334
Fundamentals of Computer Graphics

- Excerpt from recent final projects using a sandbox…







CS251 Details

- Course website:
  - http://www.cs.purdue.edu/homes/aliaga/cs251-19
- Instructor:
  - Daniel G. Aliaga (aliaga@cs.purdue.edu)
  - Office hours: LWSN 3177, by appointment
- TAs:
  - Ahmed Abdelhamid, samy@purdue.edu
  - Wenjie Bai, bai104@purdue.edu
  - Hongxin Chu, chu159@purdue.edu
  - Siddhartha Shankar Das, das90@purdue.edu
  - Ans Fida, afida@purdue.edu
  - Negin Karisani, nkarisan@purdue.edu
  - Meher Chaitanya Pindiprolu, mpindipr@purdue.edu
  - Office and Office hours: LWSN B116; TBD
- Lecture:
  - MWF, 8:30-9:20am, MATH 175
- PSOs:
  - many of them

CS251 Workload

- Lectures
  - 3 times a week (50 minutes each)
- PSOs
  - Once a week
- Work Load
  - 1 final: 2 hours
  - 1 midterm: 1-2 hours
  - 5 homeworks: 30-60 minutes
  - 5 programming projects: “1-4 weeks”

Lecture Schedule 1 of 2

- Week 1: Introduction and Algorithm Analysis
- Week 2: Analysis, Stacks, Queues
- Week 3-4: Lists, Trees, Heaps, Priority Queues, Hashing, Sorting Basics
- Week 5-6: Searching and Sorting
- Week 7-8: Graphs
- ***Week 9: Midterm***

Lecture Schedule 2 of 2

- Week 10: Spring Break
- Week 11: Graphs
- Week 12-14: Strings
- Week 15: TBA
- Week 16: Review
- ***Final Exam***

Homeworks

- 1: Algorithm Analysis (1 week)
- 2: Hashing and Basic Sorting (1 week)
- 3: Graphs (3 weeks including Spring Break)
- 4: Strings I (1 week)
- 5: Strings II (1 week)

Programming Projects

- 1: Hello World (1 week)
- 2: Stacks and Queues (2 weeks)
- 3: Hashing/Heaps (3 weeks)
- 4: Searching/Sorting (4 weeks, including SB)
- 5: Graphs (4 weeks)

Getting Started!

- Lectures this week
  - C++
  - Algorithm Analysis
- PSOs
  - This week: none
  - Next week:
    - C++, programming environment, turnin
- Assignments
  - First homework goes out Friday
  - First programming project goes out Monday

Questions?