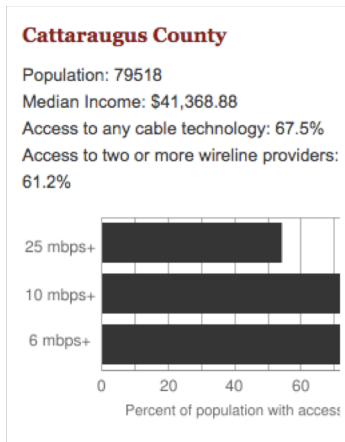


Lecture 3

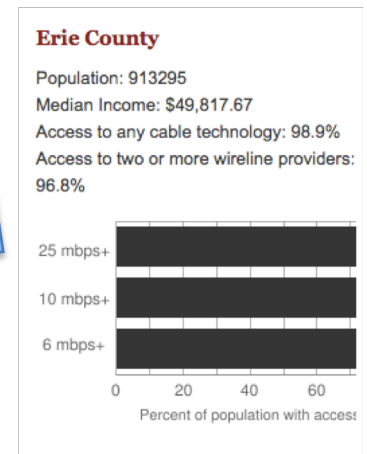
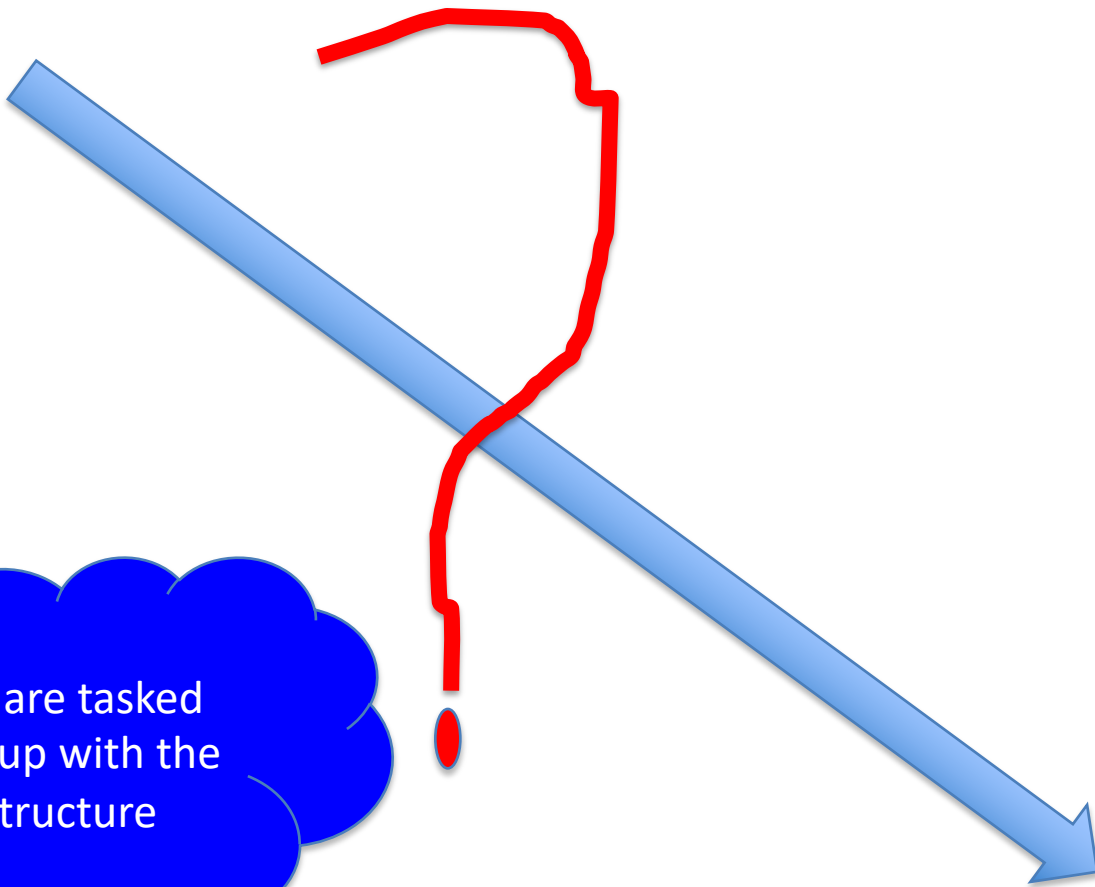
CSE 331

Jan 31, 2020

Make broadband more available



Say you are tasked to come up with the infrastructure



Make broadband more available

Input requirements

Where are the customers located?
What are the bandwidth requirements?
How is the input represented?

What objective are we optimizing?
How should the connections be configured?

Output requirements

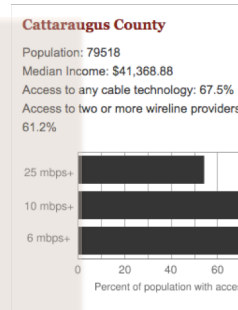
Problem Definition

Where should we lay down the physical stuff?
What algorithm should be use to do this?

Algorithm Design

Implement the scheme

How should we do testing and maintenance?



Decide whether this will be for-profit enterprise

What are technology should we use?

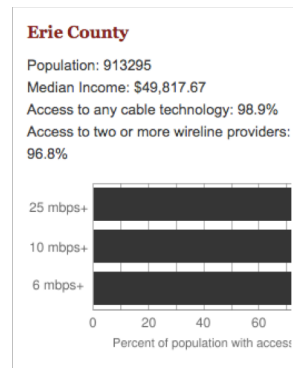
Get regulatory approval

Get funding

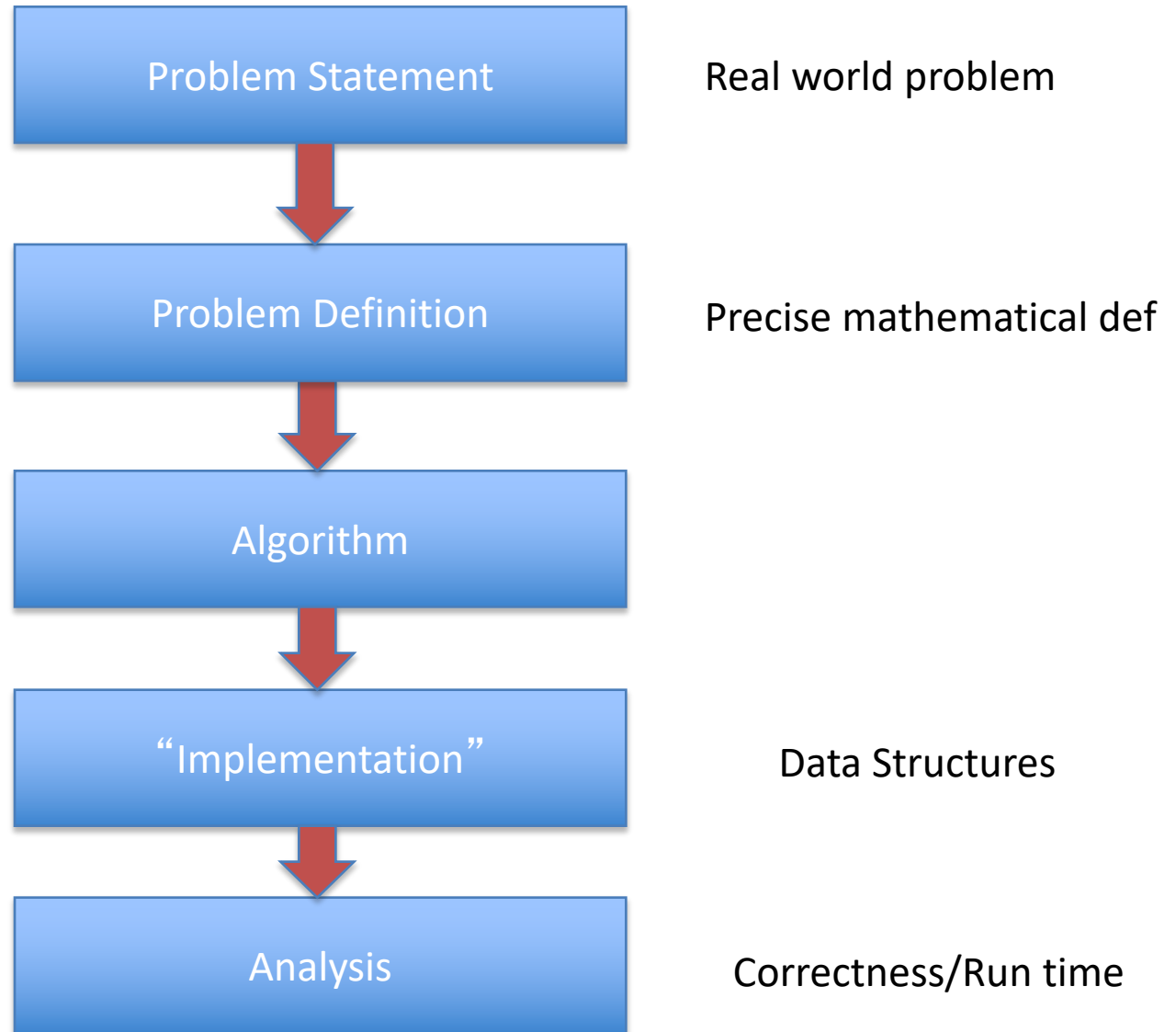
Hire people

Get access to physical space

Outreach



Main Steps in Algorithm Design



National Resident Matching

Preparing for #Match2018?

**Frequently
Asked
Question**

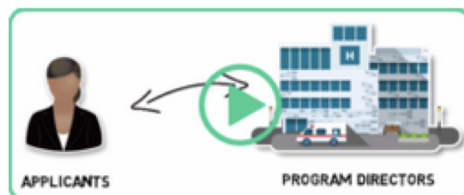
**An NRMP ID is
NOT Required for
Submitting Your
Applications**

[>> Learn more](#)

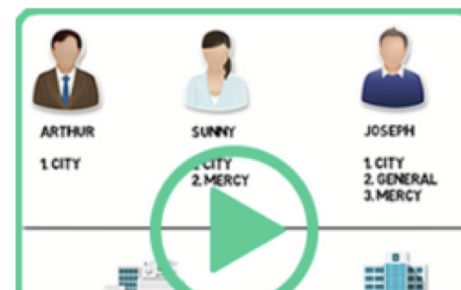
WHAT'S HAPPENING

- Check the Eligibility of Applicants
- Registration Open for Adolescent Medicine, Medical Toxicology, and Headache Medicine
- Timely Residency Applicant Resources
- Registration Open for Colon & Rectal Surgery, Medical Genetics, Sleep Medicine, and Spinal Cord Injury

[READ MORE](#)



VIDEO: The Match Process for Applicants



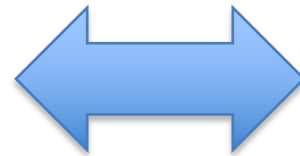
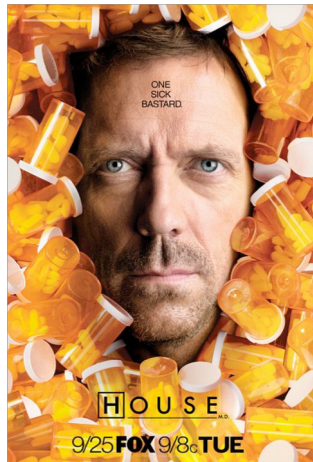
(Screen) Docs are coming to BUF



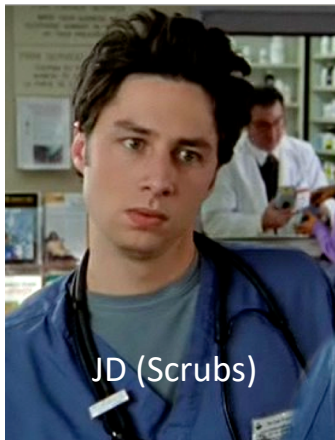
Bailey (Grey's Anatomy)



Buffalo General

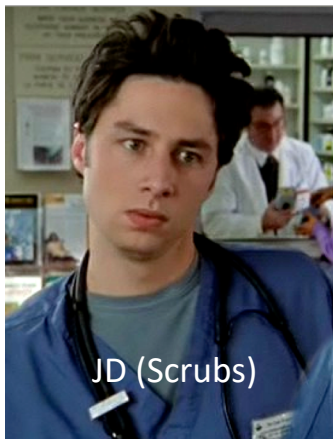
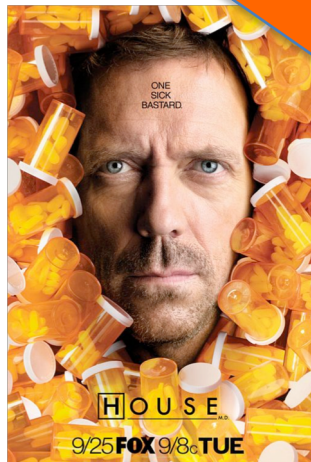


Millard Fillmore (Suburban)

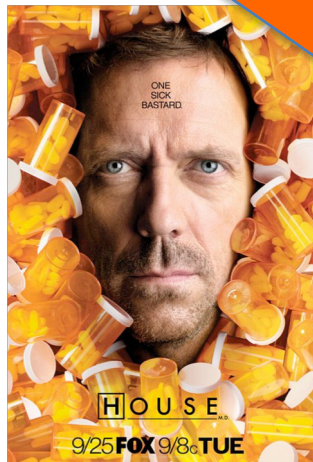


JD (Scrubs)

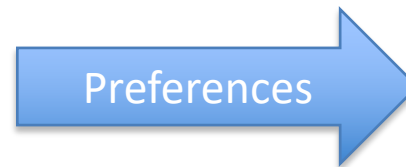
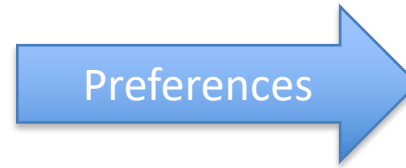
What can go wrong?



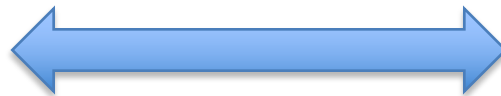
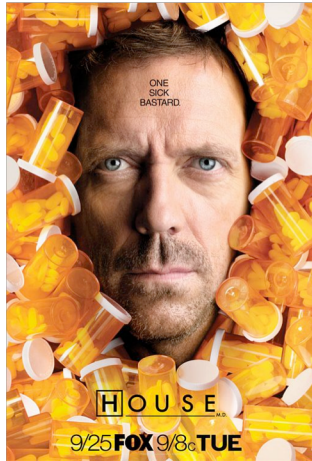
The situation is unstable!



What happens in real life



NRMP plays matchmaker



Stable Matching Problem



David Gale



Lloyd Shapley

Questions/Comments?

Matching Employers & Applicants

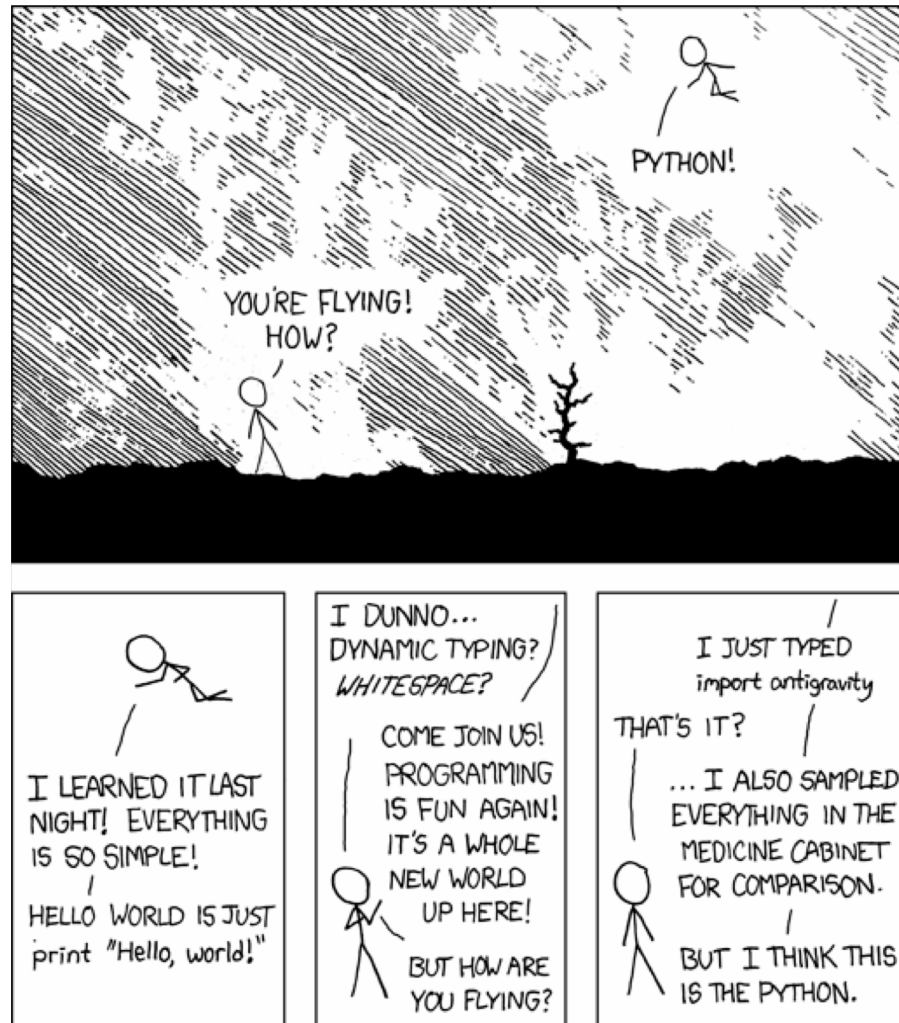
Input: Set of employers (E)
Set of applicants (A)
Preferences

Output: An assignment of applicants to employers that is “stable”

For every x in A and y in E such that x is **not** assigned to y , either

- (i) y prefers every accepted applicant to x ; or
- (ii) x prefers her employer to y

Simplicity is good



What questions to think about?

1) How do we specify preferences?

Preference lists

2) Ratio of applicant vs employers

1:1

3) Formally what is an assignment?

(perfect) matching

4) Can an employer get assigned > 1 applicant?

NO

5) Can an applicant have > 1 job?

NO

6) How many employer/applicants in an applicants/employers preferences?

All of them

7) Can an employer have 0 assigned applicants?

NO

8) Can an applicant have 0 jobs?

NO

Lost in Notation....

CSE 331 Spring 2020 Schedule

Previous schedules: [2019](#), [2018](#), [2017](#), [2016](#), [2014](#) [↗](#)

▲ Future Lectures

The topics for lectures in the future are tentative and subject to change. Also the links for future lectures are from [Fall 2018](#) and [Fall 2019](#). Recordings of Spring 2020 lectures are also available from [UBLeArns](#).

Date	Topic	Notes
Mon, Jan 27	Introduction 📄 📄 📺 S20 📺 F19 📺 F18	(HW 0 out) 📄 ↗ Week 1 recitation notes
Wed, Jan 29	Main Steps in Algorithm Design 📄 📄 📺 S20 📺 F19 📺 F18	📄 ↗
Fri, Jan 31	Stable Matching Problem 📺 F19 📺 F18 x²	[KT, Sec 1.1]

notations

Questions/Comments?

Non-feminist reformulation

n men

Each with a preference list

n women

Match/marry them in a “stable” way