Lecture 15

CSE 331

Oct 3, 2016

Mini Project Pitch due WED

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Actions

You can submit mini project reports now

You can now submit your mini project reports now. It is due in a bit over 2 weeks: by **11:59pm on Wed, Oct 4**.

The mini-project page has all the details on what is needed in the report.

Some important points:

- If you do not register your group by 11:59pm on Monday, you will get an automatic 0 on the entire mini-project.
- The case-studies will be assigned in the order in which I grade your reports.
  - If while grading it turns out another group has already taken your case study I will ask you to choose another case study.
  - If you want to "book" your topic sooner, I would recommend that you submit your report as soon as it is ready and send me email saying it is ready to be graded.
  - By default I will start grading on Oct 5.
- This is a **group submission**. Please see the instructions at the end of this post.
  - Main thing: do **NOT** submit your report till your group is formed.

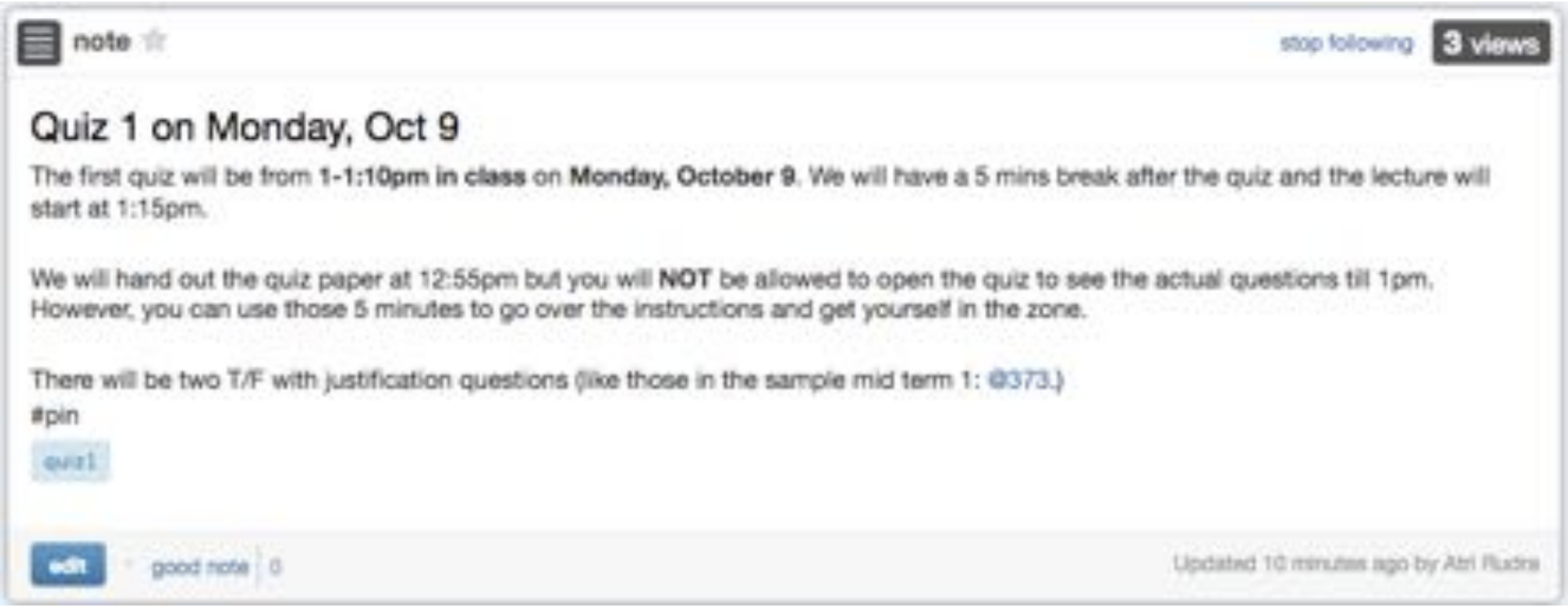
Form your group on Autolab BEFORE submitting your pitch

========== Instructions on forming the group ==========

- Under "Options" click on "Group Options"
- Name your group if you want (not required)
- Enter the name of the 2nd person in your group and then click on "Create Group". (Unless things have changed, Autolab does

Do not forget to add URL to your references

Quiz 1 next Monday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Quiz 1 on Monday, Oct 9

The first quiz will be from **1-1:10pm in class** on **Monday, October 9**. We will have a 5 mins break after the quiz and the lecture will start at 1:15pm.

We will hand out the quiz paper at 12:55pm but you will **NOT** be allowed to open the quiz to see the actual questions till 1pm. However, you can use those 5 minutes to go over the instructions and get yourself in the zone.

There will be two T/F with justification questions (like those in the sample mid term 1: @373.)

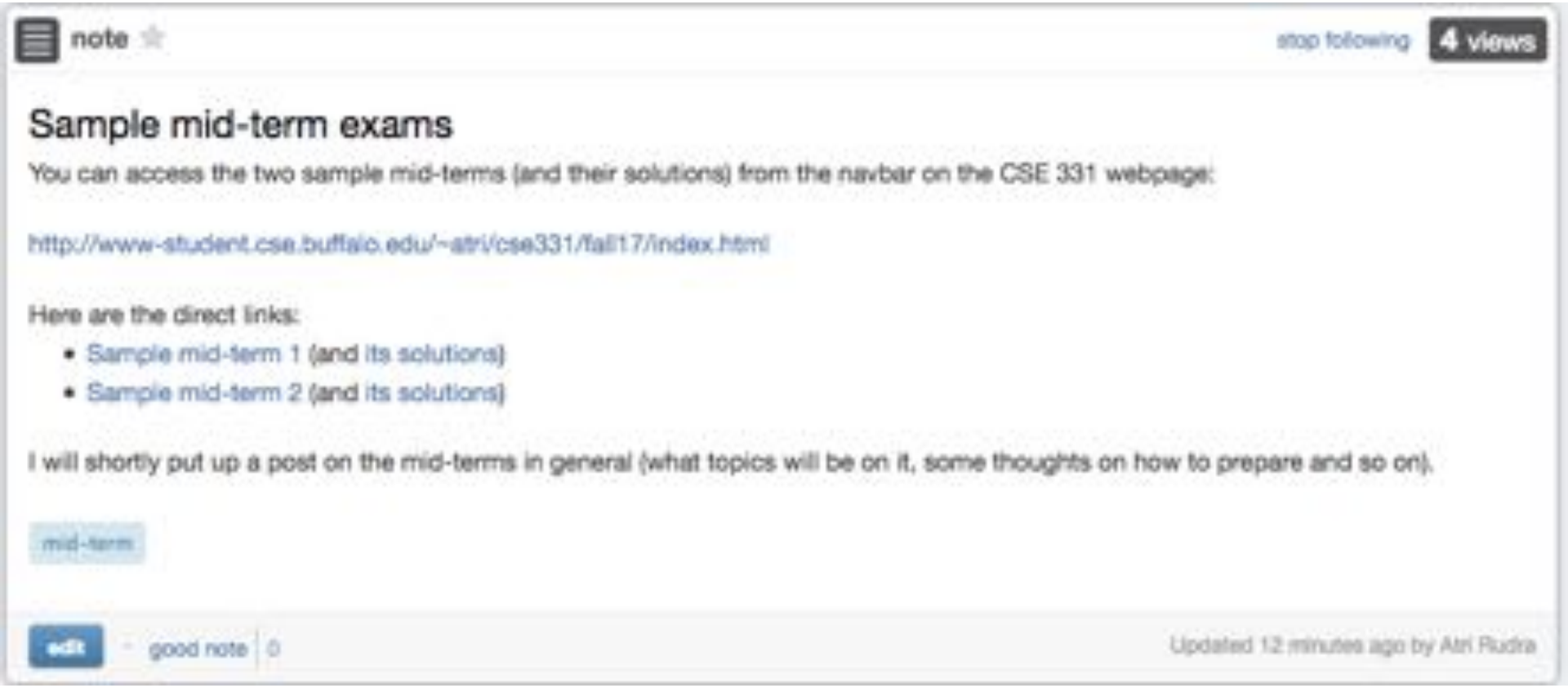
#pin

quiz1

edit · good note | 0

Updated 10 minutes ago by Atri Rudra

Sample mid-terms



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Sample mid-term exams

You can access the two sample mid-terms (and their solutions) from the navbar on the CSE 331 webpage:

http://www-student.cse.buffalo.edu/~atri/cse331/fall17/index.html

Here are the direct links:

- Sample mid-term 1 (and its solutions)
- Sample mid-term 2 (and its solutions)

I will shortly put up a post on the mid-terms in general (what topics will be on it, some thoughts on how to prepare and so on).

mid-term

edit

good note | 0

Updated 12 minutes ago by Atri Rudra

The mid-term post

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The mid-term post

First, midterm-I is on **Monday, Oct 16** and midterm-II is on **Wednesday, Oct 18** during the usual class timings (i.e. 1:00-1:50 in NSC 225). Below are some comments that might be helpful to prepare for the mid-term.

(**Related post:** A followup post on what to do *during* the exam here: @371)

- Work through the sample mid-term exams (@373). Do **not** use the sample mid-term to deduce **anything** about the relative coverage of different topics. (See points below for more on the coverage.) The sample mid-terms are meant for you to see the format of the questions. The *actual mid term exams will be harder than the sample mid term exams*. The actual mid-terms will follow the exact same format for the sample midterms: i.e. first mid-term will be only T/F while the second ones will be longer ones.
- I encourage you to not look at the solutions to the sample mid-terms before you have spent some quality time by yourself on the mid-term questions first.
- Use the quiz on Oct 9 (@374) to get some practice in solving T/F questions under some time pressure. Also review the T/F polls for more examples of such T/F questions.
- Review the HW problems/solutions. There will be at least one problem (among mid-term-I and mid-term-II) that will be closely related to a HW problem. If you did not pick up solutions to a HW (or misplaced them), they'll be available for pickup: see @510.
- You **will** be under (a bit of) time pressure in the mid-term exams-- it might be useful for you to use the sample mid-term to decide on how much time you are going to spend on each question. Also read the instructions on the first page and keep them in mind during the exam (the instructions will of course be repeated on the exam sheet).
- If you need help attend the usual recitation, office hours. We will have extra office hours the week of the exam.*Stay tuned for more details on this.*

Story Behind the HW #1

note

2 views

Actions

Story Behind the HW #1: Q3 on HW 3

Throughout the course there will be HW problems based on some really cool algorithmic idea (at least according to me!) that has some real life application and/or is something that I have used in my research. After the solutions for the corresponding HW have been handed out, I'll followup with a post on piazza giving more pointers for the connection. This is the first one in the series and is related to Q3 on HW 3.

First, from the description of DFT on the support page, it follows that a solution for Q3 on HW3 implies an $O(n \log n)$ time algorithm to compute the DFT. In other words, the algorithm gives a Fast Fourier Transform (or FFT) that consistently finds itself among the top 10 algorithms from the 20th century in various compilations (e.g. this one).

Generally the FFT is stated as a "Divide and Conquer" algorithm (see e.g. Sec 5.6 in the book). However, I personally think the distributive law based algorithm (which is what Q3 as asking for) is more natural and also cleaner (e.g. you do not have worry about complex numbers and roots of unity).

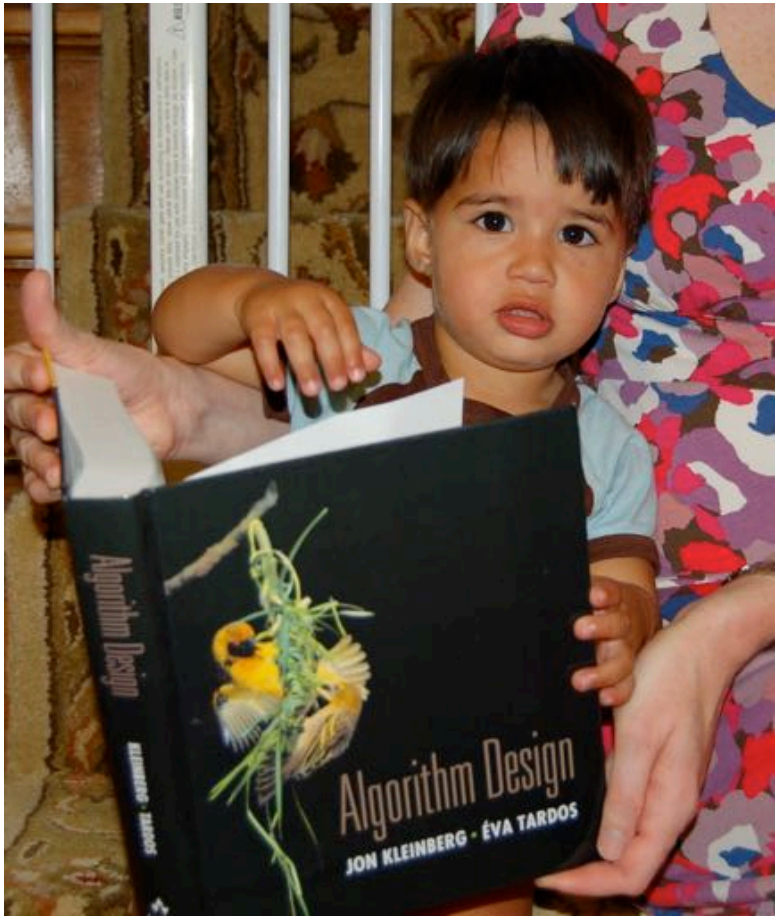
(*Side Note*: As far I understand, the divide and conquer based algorithm heavily uses the structure of the DFT matrix and does not work for the class of matrices in Q3. If I'm mistaken, please let me know!)

For me the coolest thing about the distributive law strategy is not that it recovers FFT (even though it is definitely cool), but that distributive law strategy can recover tons of other algorithms (in areas such as error-correcting codes and machine learning). See this survey by Aji and McEliece for an overview of this. (This is paper that got me started on this front.)

Couple of years back, I and my collaborators have worked on extending the Aji-McEliece framework to work for even more general framework (while also improving upon existing results). Here are two papers: the first one is long while the second one uses the database language (but is relatively shorter). Also here is some idiot trying to explain these ideas (including talking about the FFT):

Reading Assignment

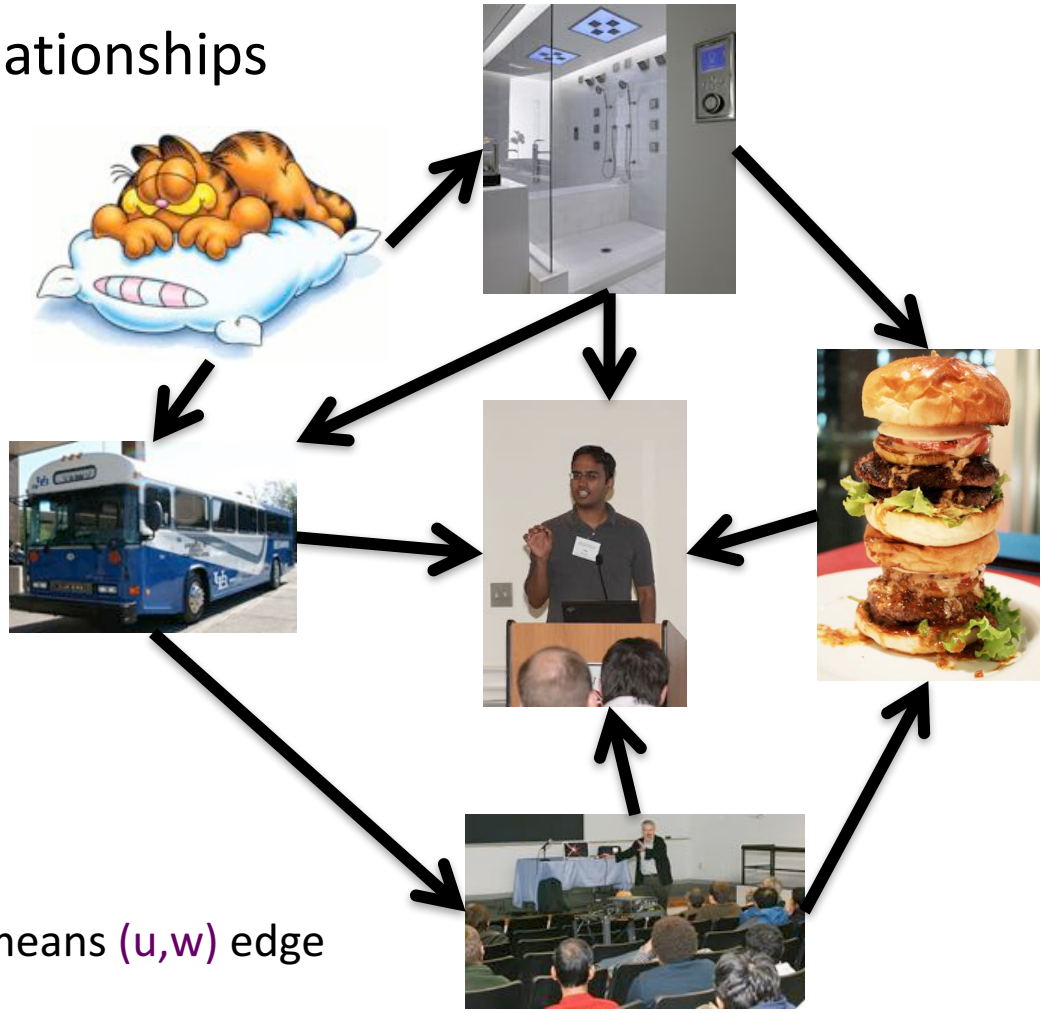
Sec 3.3, 3.4 and 3.5 of [KT]



Directed graphs

Model asymmetric relationships

Precedence relationships

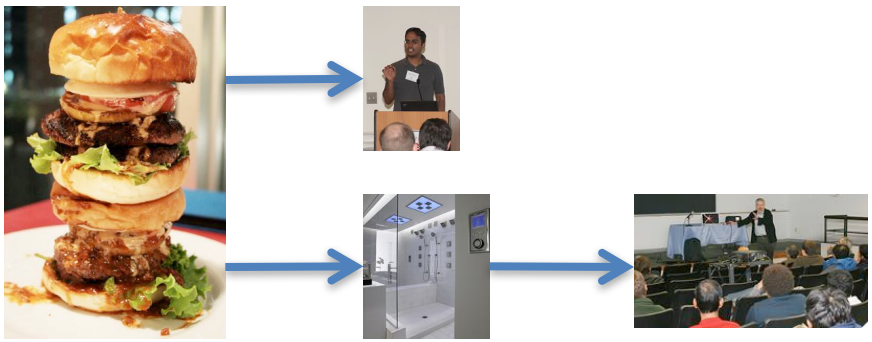


u needs to be done before w means (u,w) edge

Directed graphs

Adjacency matrix is not symmetric

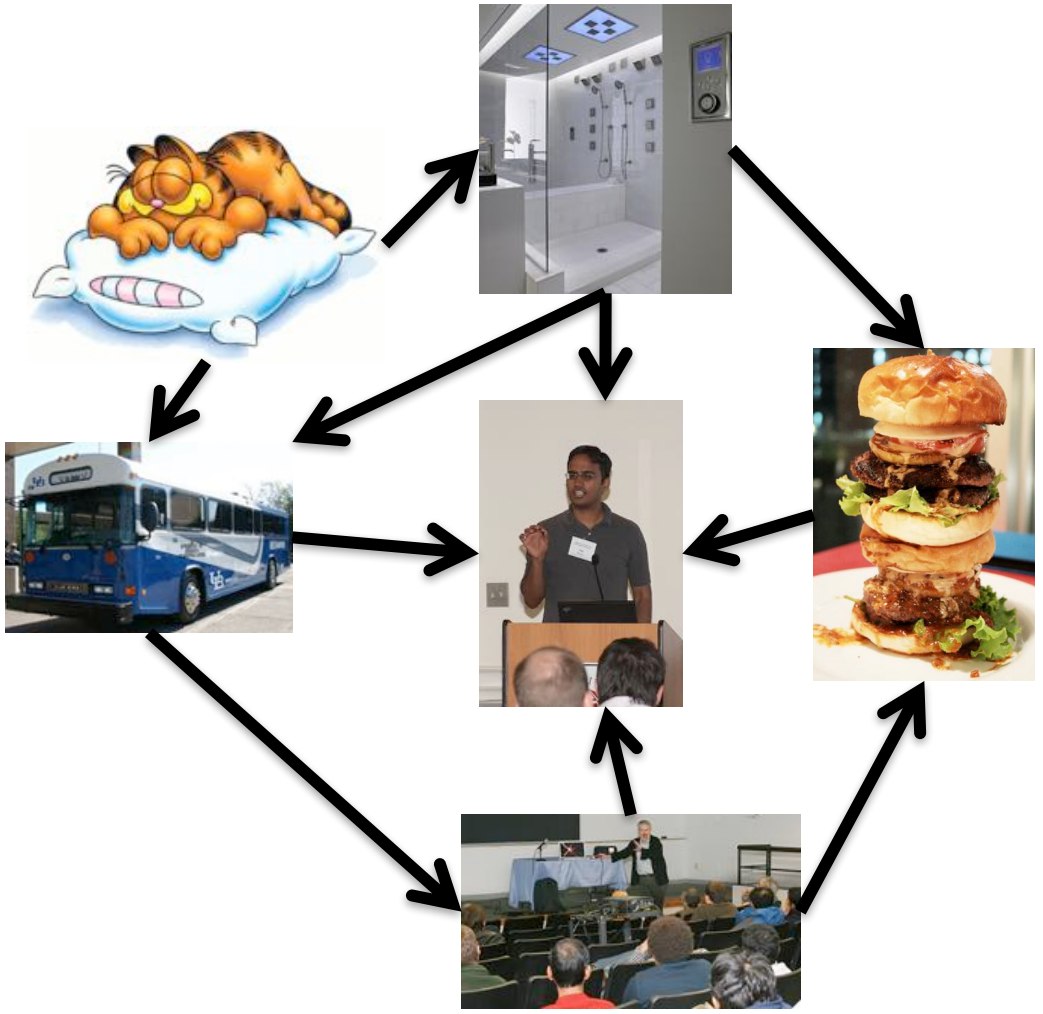
Each vertex has two lists in Adj. list rep.



Directed Acyclic Graph (DAG)

No directed cycles

Precedence relationships are consistent



Topological Sorting of a DAG

Order the vertices so that all edges go “forward”