

# Lecture 17

CSE 331

Oct 6, 2023

Quiz 1– 11:02-11:12am

Lecture starts at 11:17am

# Quiz 1 timelines

**Solutions:** posted by today evening

**Grading:** finished by next week

# Please do fill in the feedback

note @281

stop following **2 views**

Actions ▾

## Feedback on CSE 331

Every year, I ask y'all to give feedback on CSE 331, so here is the feedback form for this year:

[https://docs.google.com/forms/d/e/1FAIpQLSccl3IQ94qRM-T1gQWcnuU5Fnky9m\\_6Ddwi9sj0IDMqrAGkng/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSccl3IQ94qRM-T1gQWcnuU5Fnky9m_6Ddwi9sj0IDMqrAGkng/viewform?usp=sf_link)

Filling in this form is **completely optional and anonymous**.

In particular, I would love feedback (even if it is critical). Many of the aspects of CSE 331 that you (might) like were suggested by someone in a previous incarnation of CSE 331. While I'll try and incorporate as much as I can this fall, some of your suggestions might have to wait for the next offering.

I might also dis-agree with your feedback but after a week or so, I'll post my response to the feedback from y'all. So at the very least y'all would get to hear my reasoning for why certain things are the way they are in CSE 331. And then we can agree to disagree 😊

feedback

Edit good note | 0

Updated 6 minutes ago by Atri Rudra

# My office hour today

note @292   

stop following **1 view**

Actions ▾

## My office hour tomorrow (Friday 1pm)

I'll either have to skip (or be  $\geq$  30 mins late for) my office hour tomorrow at 1pm so that I can scan the quizzes for Autolab. Sorry about that!

Dylan will be there in Baldy 127.

office\_hours

Edit good note | 0

Updated 31 seconds ago by Atri Rudra

# Project released

note @267

stop following

96 views

Actions

## 331 project released

Alrighty, the 331 project details are now out:

<http://www-student.cse.buffalo.edu/~atri/cse331/fall23/project/index.html>

(You can also access the page from the "Project" dropdown menu on the top navbar. You might need to force refresh/clear your cache to see it in there.)

Autolab will start accepting submissions from 11:45pm tonight (there are ten deadlines spread over the rest of the semester).

There *is* a lot of details in the project pages so I would recommend that y'all read through very carefully as a group. I would like to point out something that might not be as intuitive:

### YOU NEED TO FORM GROUPS 10(TEN)!!!! TIMES ON AUTOLAB

Your group will have 10 problems to submit on Autolab (five [coding problems](#) and five [reflection questions](#)). However, **you will need to form your group for EACH submission separately.**

We understand that this will probably be a bit annoying to do but currently Autolab is not setup for us to upload the group information.

project



# Lawsuit against Spectrum

**FILED: NEW YORK COUNTY CLERK 02/01/2017 12:05 AM**

NYSCEF DOC. NO. 1

INDEX NO. 450318/2017

RECEIVED NYSCEF: 02/01/2017

**SUPREME COURT OF THE STATE OF NEW YORK  
COUNTY OF NEW YORK**

-----X  
**THE PEOPLE OF THE STATE OF NEW YORK,  
by ERIC T. SCHNEIDERMAN, Attorney General of the  
State of New York,**

**Plaintiff,**

**SUMMONS**

**-against-**

**Index No.:** 450318/2017

**Plaintiff designates New  
York County as the Place  
of Trial**

**CHARTER COMMUNICATIONS, INC. and SPECTRUM  
MANAGEMENT HOLDING COMPANY, LLC  
(f/k/a TIME WARNER CABLE, INC.),**

# Five coding problems

## Coding Problems for Project

Problems 1 and 2 (**Coding**) due at **11:59pm, Friday, November 3, 2023**.

Problem 3 (**Coding**) due at **11:59pm, Friday, December 1, 2023**.

Problems 4 and 5 (**Coding**) due at **11:59pm, Friday, December 8, 2023**.

All submissions should be done via [Autolab](#).

### Acknowledgment

The development of the project was supported by a [Mozilla Responsible Computer Science award](#) . The support is gratefully acknowledged.

## Some Suggestions and Warnings

While this coding part of the project is somewhat similar to Question 3s on the homework, there are some crucial differences and we wanted to highlight few things for y'all upfront:

### Form groups of size **EXACTLY 3**

This is a group project (unlike Q3s on the HWs that had to be done individually) and you can work in groups of size **exactly 3**. The submissions will be on Autolab and *everyone in the group will get the same grade*.

# Each like a HW Q3

Java Python C++

## Directory Structure

You can get full credit  
with code length  
along the lines of Q3  
submissions!

More work to  
**UNDERSTAND** the  
problem

You are given ten coding files. Out of these, you can safely ignore `Enums.py` and `LinkedList.py`. The `Enums.py` file is used to define the constants for the problem. For example, `Enums.py` is used in conjunction with the file I/O code. `LinkedList.py` is an implementation of a linked list.

`Driver.py` takes the input file, parses it using `Utility.py` and calls your `Solution.py` class' `output` method. The `output` method should return the output by you (along with, depending on the question, the updated bandwidths and packet priorities) are passed to `Utility.py`. `Utility.py` processes them and determines the routing delay faced by each client. Finally, these delays are passed into the revenue calculator `RevenueCalculator.py` which calculates the revenue you gathered based on your routing decisions. You only need to update the `Solution.py` file. You may write your own helper functions to help you solve the problem.

The `Solution` class contains four data structures.

- `problem`, which simply contains the problem number of the current template as a member variable on the `Solution` class. You DO NOT need to worry about this variable.
- `isp` which is the ID of the ISP node. Note that this is the same as content provider or  $i$  as mentioned in the problem description.
- `graph` which is the input graph  $G$  in the adjacency list representation that you are familiar with. The key is a node ID (not client, there are nodes that may not be clients) and

# Five reflection problems

## Reflection Problems for Project

Problems 1 and 2 (**Reflection**) due at **11:59pm, Monday, November 6, 2023.**

Problem 3 (**Reflection**) due at **11:59pm, Monday, December 4, 2023.**

Problems 4 and 5 (**Reflection**) due at **11:59pm, Tuesday, December 12, 2023.**

All submissions should be done via [Autolab](#).

### There is no "right" or "wrong" answer

Perhaps the biggest difference from other CSE 331 questions (both programming and proof based questions) is that pretty much no answer is "right" or "wrong" in any absolute sense. Y'all will notice that for some of the questions, the answer might depend on some of the assumptions you make -- and in many cases the answer would really depend on *who* is answering the question. While ambiguity might feel a bit disquieting, the **ambiguity is inherent** for these kinds of questions: so embrace the ambiguity!

More specifically, do not waste your time trying to figure out what I am expecting from an answer-- because I do not have any set answer that I'm looking for! What I am interested in is hearing your group's thoughts on the questions. In particular, **even if I disagree with your justification, that does NOT mean you will get penalized.** Again there is no "right" or "wrong" answer!

While this coding part of the project is somewhat similar to Question 3s on the homework, there are some crucial differences and we wanted to highlight few things for y'all upfront:

### Form groups of size EXACTLY 3

This is a group project (unlike Q3s on the HWs that had to be done individually) and you can work in groups of size **exactly 3**. The submissions will be on Autolab and *everyone in the group will get the same grade.*

# Reflect on your design choices

## Algorithm Idea (2 points)

In one paragraph, state the algorithm idea behind the code that you submitted for the second [coding problem](#). This would be similar to a usual algorithm idea submission in a homework.

## Whom does your algorithm work best for? (2 points)

What clients does your algorithm try to make their  $pen_0$  value to be 0? I.e. for which clients  $c$  does your algorithm try to make sure to try get the  $pmt_c$  revenue from them? Show how your answer follows from the algorithm idea above.

## Whom doesn't your algorithm work well for? (2 points)

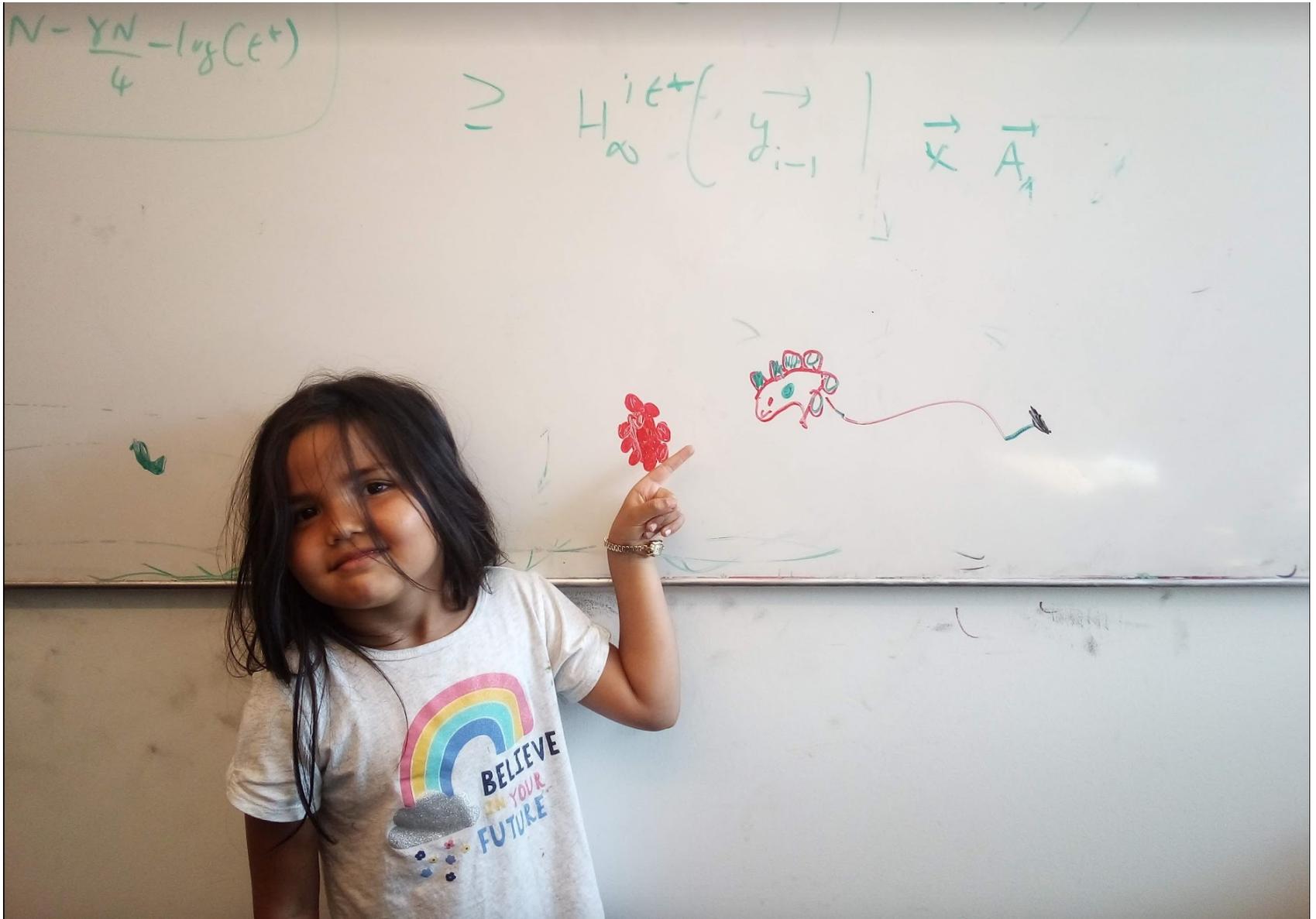
What clients does your algorithm *not* try (actively) to make their  $pen_0$  value to be 0? I.e. for which clients  $c$  does your algorithm not mind to get a revenue of  $c$  from them? Show how your answer follows from the algorithm idea above.

## How fair is your algorithm? (4 points)

How fair was the decision that your group made in the algorithm design to favor one group of customers (those identified in the second question above) over another (those identified in the third question above)? **Justify** your answer.

If some of your customers are not as well served as others, are there ways for you to address this unfairness that might result in a more ethical distribution of services?

# Questions/Comments?



# Interval Scheduling Problem

**Input:**  $n$  intervals  $[s(i), f(i))$  for  $1 \leq i \leq n$

**Output:** A schedule  $S$  of the  $n$  intervals

No two intervals in  $S$  conflict

$|S|$  is maximized

# Analyzing the algorithm

$R$ : set of requests

Set  $S$  to be the empty set

While  $R$  is not empty

    Choose  $i$  in  $R$  with the earliest finish time

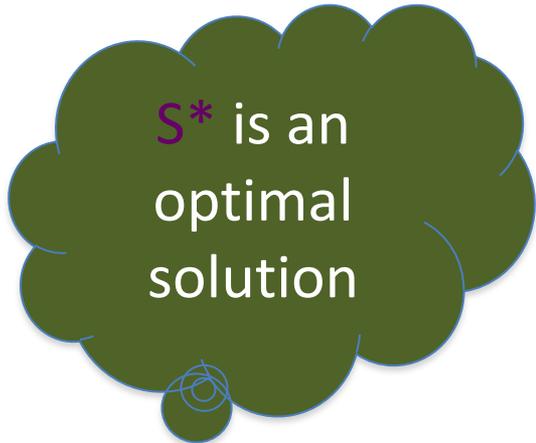
    Add  $i$  to  $S$

    Remove all requests that conflict with  $i$  from  $R$

Return  $S^* = S$



$S^*$  has no conflicts



$S^*$  is an optimal solution

# Greedy “stays ahead”



# Today's agenda

Prove the correctness

(If we have time) Analyze run-time of the greedy algorithm

# Argue correctness on the board...

