

# Lecture 28

CSE 331

Nov 3, 2014

# Mini project report due WED

note ☆ stop following 68 views

## Mini Project Report due Nov 5

A gentle reminder about the upcoming deadline of 11:59pm to email me your group's project report. For more details see:

<http://www.cse.buffalo.edu/~atri/courses/331/handouts/mini-project.pdf>

(The link is also available from the "Resources" tab.)

#pin

mini\_project

edit good note 0 4 days ago by Atri Rudra

# Mini Project Report

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## Verbiage in your mini project report

Just a clarification: While you can definitely use sources for your algorithm for the mini-project you are expected to write the report in your own words (and also cite your sources). I.e. read through the source, understand the material and explain in your own words.

mini\_project

[edit](#) | good note | 0 Just now by Adh Rudra

# Response to Feedback

## Response to feedback

First, I apologize for my delay in posting my response to the feedback: it took me a bit longer than expected.

Thanks again to all of you who gave feedback. It was very helpful and I was able to at least start some changes that hopefully will alleviate some of the complaints. Of course it is impossible to address all concerns (some of which I don't agree with), so my hope with this post is to share my thoughts with you so that even if I do not agree with my comment, at least you know why I disagree.

Even if you did not submit any feedback, reading through the post might be helpful to you so I recommend that you at least scan through the list below. Also if you have further comments, feel free to use the comments section of this post and/or use the anonymous feedback link (which you can get from the "Resources" tab).

Below is a list of the comments that I thought I should address. I have paraphrased the feedback/comment in bold and then my response follows. The ordering is roughly in the reverse chronological order of when the feedback was posted.

- **Too much time commitment for the course.** I agree that you need to put in a fair amount of time for the course and all of you are busy. However, in my experience of having taken multiple algorithms (or algorithms related courses), the only ones from which I remember anything down the line are those that I needed to work really hard on. Courses that did not require much time commitment, I really did not learn anything. Of course all of us have limited time and various things we need to take care of and I understand it might not be possible for you guys to be able to devote a large chunk of time consistently throughout the semester. This is why I drop the lowest three HW scores and have the option of replacing your mid-term exam score with your final exam score so that you can better deal with those times when you just did not have enough time to devote to 331.
- **HWs do not have enough weightage.** Even though HWs as stated are "only" worth 21-24% of the grade, you cannot do well on the exams if you do not work hard on your homeworks. So even if the immediate gain on HWs is 21-24% of the grade in effect the time that you spend on HWs is worth more than 90% of the grade.

# Oct Piazza Participation Report

 note ☆

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## October Piazza Report

I apologize for forgetting to post the relevant piazza participation stats earlier. I'm doing so now so that you guys can figure out where you stand (please see the syllabus for the generic rubric for piazza participation). If I had to assign the piazza participation score today, here is how it will look:

- If you have made 0 contributions, you get 0/2.
- If you made 1 or 2 contributions, you get 1/2.
- If you made 3 or more contributions, you get 2/2.

To see your stats (i.e. your number of contributions) click the "Statistics" tab on the top panel.

Hope this helps!

[grading](#) [piazza](#)

[edit](#)

good note | 0

12 hours ago by Adri Rudra

# Mergesort algorithm

Input:  $a_1, a_2, \dots, a_n$

Output: Numbers in sorted order

```
MergeSort( a, n )
```

```
  If  $n = 1$  return the order  $a_1$ 
```

```
   $a_L = a_1, \dots, a_{n/2}$ 
```

```
   $a_R = a_{n/2+1}, \dots, a_n$ 
```

```
  return MERGE ( MergeSort( $a_L, n/2$ ), MergeSort( $a_R, n/2$ ) )
```

# Correctness

Input:  $a_1, a_2, \dots, a_n$

Output: Numbers in sorted order

MergeSort( $a, n$ )

If  $n = 1$  return the order  $a_1$

$a_L = a_1, \dots, a_{n/2}$

$a_R = a_{n/2+1}, \dots, a_n$

return MERGE ( MergeSort( $a_L, n/2$ ) MergeSort( $a_R, n/2$ ) )

By  
induction  
on  $n$

Inductive step follows from correctness of MERGE

# Rest of today's agenda

Analyze runtime of mergesort algorithm



# Divide and Conquer

Divide up the problem into at least two sub-problems

Recursively solve the sub-problems

“Patch up” the solutions to the sub-problems for the final solution

# Improvements on a smaller scale

Greedy algorithms: exponential  $\rightarrow$  poly time

(Typical) Divide and Conquer:  $O(n^2)$   $\rightarrow$  asymptotically smaller running time

# Multiplying two numbers

Given two numbers  $a$  and  $b$  in binary

$$a = (a_{n-1}, \dots, a_0) \text{ and } b = (b_{n-1}, \dots, b_0)$$

Compute  $c = a \times b$

Running time  
of primary  
school  
algorithm?