

Analysis of Algorithms
CS 375, Spring 2019
Project 2 (Presentation 1)
Presentations in class Wednesday, April 3

Project 2 (Presentation 1): Sorting Algorithm Presentation

In this assignment, you'll work in teams (picked randomly by your prof.) to create and deliver a technical presentation about an algorithm—in particular, about a sorting algorithm. The goals of this project are:

- to give you practice understanding a topic well enough to give a technical presentation about it;
- to give you practice giving a technical presentation; and
- to give you more practice working with other students as a team.

Assignment

Choose a sorting algorithm from the following list and give a technical presentation of that algorithm.

- Quick
- Heap
- Radix
- Shell
- Tree
- Comb

If your team really wants to present a sorting algorithm not on the list, feel free to ask me about your sorting algorithm of choice! (Common, well-studied algorithms such as Bubble Sort, Insertion Sort, Selection Sort, Mergesort, etc., will not be approved as alternatives.)

For purposes of your presentation, you may assume that the data to be sorted are integers stored in random order in an array, but be sure you understand the algorithm at a deeper level than that. For example, in the question and answer period after your presentation, I may ask you:

- whether the algorithm will work or can be modified to work in the case where the data is stored in a doubly-linked list instead of in an array;
- how well your algorithm works on an array that is already sorted, almost sorted, or sorted in the reverse order; and
- about sorting arrays of data other than integers.

Your Presentation

For your presentation, plan on using up to a maximum of 17 minutes, which means your talk should take about 14–15 minutes and should leave 2–3 minutes for setup at the beginning and questions at the end. As with technical presentations in general, it's good to *over-prepare*: Be sure you know your material in more depth than needed for the presentation, so you can answer questions from the audience (including me!). In particular, you are strongly encouraged to find other information on your algorithm than what is in our textbook, to be sure you understand the algorithm thoroughly.

Some things you should include in your presentation (not necessarily in this order!):

- A high-level summary showing how the algorithm works.
- A correctness argument, showing that it always works correctly. This is more directly connected to the details of the algorithm, as opposed to the more abstract, high-level overview mentioned above.
- A short example that you step through, to give your audience a sense of how the algorithm works.
- An implementation of your sorting algorithm.
- A graphical representation (e.g., pictures or an animation) of the array at several crucial points during execution.
- A complexity analysis of your algorithm, including what the worst-case and best-case (and, if possible and relevant, average case, randomized case, and amortized case) time complexities are, and how much space (memory) is needed *beyond the original input array of data*.

You should assume that the audience is unfamiliar with your algorithm and so don't assume that they will quickly grasp it. To help prepare for the talk, please be sure to read the *advice on how to give good technical presentations*, linked from CS375's Additional Notes / Readings page.

One piece of advice: Presenters are often nervous when speaking for the first time in front of a crowd; as a result, they may tend to rush. Please try not to do that.

In addition to the presentation itself, you will need to create some supplementary material:

- You will need to write up a handout for your presentation and give copies of the handout to the audience. An (elegant) implementation of the sorting algorithm would be a good thing to include on the handout. (Your handout must be polished, easy to read, and free of grammatical errors.)
- You will also need to come up with one or more appropriate homework questions for the rest of the students in the class to do. (One good idea for a homework exercise is to present students with an array of numbers and have students show their work in sorting the array using the algorithm you're presenting. If you do that, please use an array for which sorting it will actually illustrate key ideas of the algorithm you're

presenting!) The exercise(s) should be due a week after the presentation, and on that day, you'll collect their homework, and you will grade it in time for the class after that, at which point you will turn it in to me so that I can review your grading.

Please make sure your homework exercises for the class are **on the handout** you give out to the class.

- No other supplementary material is required, but if you'd like to create any, please discuss it with me during your team's dress rehearsal (see below)!

Other Instructions and Details

- **You will be required to do a dress rehearsal** in front of me, so you must make an appointment with me sometime before the presentation. (My available times: 1:00–4:30pm, Saturday, March 16—please let me know ASAP if your group cannot meet in that timeframe!). Plan on at least 40 minutes for the dress rehearsal. You must come to the rehearsal with your handout and slides (if any) and having practiced your talk—the rehearsal is a *dress* rehearsal, not a *draft* rehearsal.

So that the dress rehearsal time can be used as effectively as possible, you are strongly encouraged to give a draft rehearsal of your presentation to some friends or other students.

Please note there will be significant deductions to your grade for a poor presentation—including things like poor organization, poor clarity of speaking, or poor knowledge of the material—so please, use the draft rehearsal(s) and dress rehearsal time wisely to polish your work as much as possible.

- You may use any of the whiteboard, the projector, the computer in the classroom, or your own computer if you wish. In any case, be sure and test any equipment ahead of time to be sure it is working properly and that you know how to operate it. Be sure and have a backup plan if the equipment fails immediately before or during your presentation. An equipment failure is not an acceptable excuse for not making a good presentation.
- You are welcome, but not required, to put your talk up on a web page and use that page during the talk and/or use the page for generating your handout.

Some suggestions for getting the audience engaged in the presentation

Dale Skrien gave these suggestions to his students for this assignment, so I'm giving them to you.

- Get the audience to care about the subject. For example, get the presentation started by asking a question whose answer the audience cares about.
- Make the material memorable. (“Remember that awesome talk by Larry, Curly, Moe last year in CS375?”)
- Try for at least one “Oh, cool!” moment.

- Don't make the audience think about irrelevant things. Keep examples simple and focused.
- Use conversational tones in presentations. Use “I”, “me”, and “we” so that the listener's brain thinks it's in a conversation, and therefore has to pay more attention to hold up its end.
- Use pictures/videos/sounds next to written material if you are using a projector (PowerPoint slides or web materials).
- Garr Reynolds, the author of *Presentation Zen*, says, “the principles and techniques for creating a presentation for a conference or a keynote address have more in common with the principles and techniques behind the creation of a good documentary film or a good comic book than the creation of a conventional static business document with bullet points.”
- Something to think about regarding your presentation (also from Garr): “If the audience could remember only one thing (and you'll be lucky if they do), what do you want it to be?”

Not all of these are obvious or easy to accomplish! Please feel free to ask me questions about them, if you'd like!

What to Hand In

Each team should submit two files:

- the handout (in PDF), as a file named `team-<LETTER>-project2_handout.pdf` (where <LETTER> is replaced by the letter corresponding to the group in the team assignments);
- the presentation materials—presumably as PowerPoint slides—as a file named `team-<LETTER>-project2_presentation.ppt` (or whatever extension is appropriate, if not PowerPoint).

(Note: If your team also has additional presentation material, as discussed in the dress rehearsal, ask me about the best way to submit those.)

Submission instructions: For this project, each group should have one “designated submitter” to handle submission of their materials. The designated submitter should submit the group's two files in two ways:

1. Please submit your group's work to the **Dropbox** folder in the CS375 filespace. (Please note: This is not Moodle!)
 - Mount the Courses/CS375 filespace (the same way as you would for other courses).
 - Go to the **Course Materials** directory, then go to the subdirectory called **Dropbox**.
 - Copy your files into the Dropbox.
2. The Dropbox method above is still experimental and may not work properly, so to make sure that your work is received promptly, please also email me (eaaron@colby.edu) the individual files.

In addition, each student is required to individually email me within a day after the project was turned in, telling me:

- how well your group worked together;
- how much (percentage) each member of your group contributed to the project; and
- how many hours you (individually) spent on this project.