

Analysis of Algorithms
CS 375, Fall 2019
Project 2: Presentation
Presentations in class DATE TBD

Project 2: 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, especially if we have already covered them in CS375 material!)

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 12 minutes, which means your talk should take about 10–11 minutes and should leave a minute or so for questions at the end. It will be your group's responsibility to be set up and ready to go promptly when your presentation is scheduled to begin. 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 of the algorithm and how it works.
- A short example that you step through, to give your audience a sense of how the algorithm works.
- Pseudocode of the algorithm, accompanied by a correctness argument.
- A complexity analysis of your algorithm, including what the worst-case and best-case (and, if relevant, average case, randomized case, or 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 not 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. Also, it might help to note that presenters are often nervous and 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, along with correctness and complexity arguments in more detail than you may have time to present during your 12-minute timeslot. 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!) Please make sure your homework exercises for the class are **on the handout** you give out to the class.

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. You will need to give numerical grades on your assignment, record them, and share those grades with me. (A shared spreadsheet document might be a good way to accomplish this.) You

may use any reasonable value as the scale for the grade—e.g., you can grade out of 10 points, or out of 6 points, or something else appropriate—but please make sure your standards for grading are applied consistently across all papers.

- 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: **TBD**.) 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.

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, and Moe last year in CS375?”) If possible, it's great to find and emphasize at least one “Oh, cool!” moment.
- Keep examples simple and focused. Don't make the audience think about irrelevant things.
- Use conversational tones in presentations. Use “I”, “me”, and “we” so that the listener's brain thinks it's in a conversation.

- Use pictures/videos/sounds next to written material if you are using a projector (with, e.g., PowerPoint slides).
- 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).

Please submit both as files; do not submit links to files or share documents, make sure they are files that can be attached to an email and later viewed offline. (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 **email me** (eaaron@colby.edu) the two files.

In addition, each student (not just the designated submitter) 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.

If you would prefer, you are welcome to see me (again, within a day after the project was turned in) to give this information and discuss your group’s dynamics and your work as part of the group. And as always, you are welcome to talk with me at any time about any questions or concerns you have regarding group dynamics (or anything else) on this project—I’ll be very happy to talk with you!