CSE 332   Summer 2021

Data Structures & Parallelism

Instructor: Kristofer Wong
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Course Webpage: http://cs.uw.edu/332
Course Prerequisites: CSE 143, CSE 311
Lecture Time: 9:40-10:40am, MWF
Quiz Section Times: A: 9:40-10:40am, Th
                           B: 9:40-10:40am, Th
                           C: 10:50-11:50am, Th

Course Information

Course Description

Covers abstract data types and structures including dictionaries, balanced trees, hash tables, priority queues, and graphs; sorting; asymptotic analysis; fundamental graph algorithms including graph search, shortest path, and minimum spanning trees; concurrency and synchronization; and parallelism.

Course Objectives:

By the end of the course, students should be able to:
- *Reason* about the following:
  - data structures
  - abstractions
  - algorithm analysis
  - parallelism
  - concurrency
- *Communicate* your reasoning to others
- *Work with a partner* on code projects
- *Read and understand code* that the student did not write
- Crush technical interviews with the skills listed above

Recommended Text: *Data Structures and Algorithm Analysis in Java 3rd Ed.*, by Mark Allen Weiss, Addison Wesley: 2012, ISBN-10: 0132576279

The text is strongly recommended but not required. Lecture does not provide enough time to cover all material in detail so reading the textbook will help you clarify topics, find more examples, and examine Java implementations of the data structures and algorithms discussed during lecture.

We will also use a set of free on-line notes by Dan Grossman for the material on parallelism and concurrency.

Computing Resources
We will use Java 11 (11, 12 or 13 will likely work) for programming assignments. We strongly recommend although will not require that you use the IntelliJ development environment. Links for downloading and installing Java and IntelliJ can be found on our course web page.

Assignments, Assessments, and Grades

Projects
There will be three programming projects. Programming projects will be graded on correctness, architecture and design, and analysis. Note that your answers to the analysis questions will be very heavily weighted. We will not grade you on code style, as long as your code is readable and you follow the guidelines explicitly given in the project handouts. Program design/architecture and analysis are crucial in this course. Except under unusual circumstances, projects will be done in pairs of two students.

We have a variety of handouts on the various tools and technologies used in this course, such as IntelliJ and Java generics. They are available in the handouts section of the course webpage.

Exercises
Exercises are *approximately* weekly assignments. These will reinforce your understanding of topics we are covering and the theory behind them. Some exercises require you to write short bits of code or complete an activity on line, while others are more traditional "written" exercises. For "written" exercises, we require these to be turned in electronically. LaTex is one option, but neatly written scanned documents will also be fine as long as they are readable.

There will be two different types of exercises:
• *Individual* exercises will be done individually and you will turn them in on Gradescope.
• *Communication* exercises will be multi-step assignments which will serve as practice for you to solve problems relating to course material and communicate your reasoning about that material to others. You and your current project partner will be paired up with another group (total of 4 students) and introduced to each other via

email. Each exercise will be split into 2 parts, A and B. You will follow the following steps:
- One person from each partnership will work on A together and the other from each partnership will work on B together.
- Each person will record a short (3-5 minute) video explaining the solution to the other group members and turn it in to the canvas group we create for you (Due Wednesdays)
- Watch the other three videos and provide feedback in the canvas discussion and grade your peers' video explanation based on a rubric that we will post on the assignment page (Due Fridays)
- Complete the other part (A or B) that you did not do with the guidance of your peers' videos and complete a reflection assignment. (Due Fridays)
- Note: communication exercises will intentionally **not** be difficult problems. If you are struggling with the first part of solving the problem, please reach out to a staff member for help. If you did a problem wrong initially in your video, you can still earn full credit by talking about that in your reflection.

Participation and Lecture activities

Your participation grade will be determined by a combination of watching lectures, posting on the Ed board, and generally engaging with the course. Given the online nature of this course, we will be as inclusive of asynchronous students as possible. That being said, synchronous attendance at lecture and section is STRONGLY encouraged to help you get the most out of this class. *You will not be required to attend lecture*, but you will be required to watch lecture recordings and we will strongly encourage you to view any supplemental materials we provide.

50% of your participation grade will come from watching lecture. We will determine this through in-class gradescope activities. These activities will be graded on completion (ie, did it or not) and will be due at 11:59 PM (PDT) before the next lecture. This deadline is to give the course staff time to read through your responses before the next lecture to gauge how everyone is doing. You may miss up to 3 lecture activities without it affecting your grade.

50% of your participation grade will come from your engagement with the course. Course engagement consists of asking *and* responding to questions on the discussion board, participating in quiz section, coming to office hours, and generally helping your peers through this course. This may look different depending on your situation and we will make reasonable accommodations for if you contact us at the **beginning of the quarter or as soon as circumstances come up** that prevent you from participating regularly with the course.

Assessments

This quarter we will NOT be having traditional quizzes or exams. Instead, we will replace traditional assessments with:

- A self-graded midterm turned in with corrections and a reflection on your performance. The reflection will be the only thing graded here, so as long as you put in effort to reflect on your understanding of the material, your grade for this will be stress-free.
- A 5-10 minute oral assessment during week nine (9) which will serve as your final. The purpose of this is to be a forcing function for review as well as to give you a feel for thinking on your feet to reason about and communicate the concepts you've learned in this class. This assessment will be extremely low-stress as long as you understand the material and have been practicing communicating your thought processes with the exercises throughout the quarter: it is quite literally an opportunity to "show us what you've learned". More information to come as we get closer to the end. Note, we will schedule these on an individual basis to accommodate for everyone's differing time zones

Grading

Final grades will be computed approximately as follows:

- 10%: Participation
- 20%: Assessments
- 35%: Programming projects
- 35%: Exercises

Extra Credit

We will keep track of any extra features you implement for programming projects (the Above and Beyond parts). You won't see these affecting your grades for individual projects, but they will be accumulated over all projects and used to bump up borderline grades at the end of the quarter. (i.e. if you are at a 3.4, almost 3.5, and did extra credit we will round your grade up. What we mean by "almost" will depend on how much extra credit you successfully completed) The bottom line is that these will only have a small effect on your overall grade (possibly none if you are not on a borderline) and you should be sure you have completed the non-extra credit portions of the homework in perfect form before attempting any extra credit. You will not receive any feedback for Above and Beyond other than whether or not you succeeded. They are meant to be fun extensions to the assignments.

Course Policies

Office Hours and One-on-Ones

If you have conceptual questions or need assistance with debugging your projects, we strongly recommend attending office hours. We will do our best to have each member of the course staff hold at least 1 office hour a week.

We recognize that not every question is appropriate for office hours, however. For example, you may wish to discuss your extenuating circumstances, need support/ advice for a personal issue, or have followup questions from a previous office hour. In these circumstances, we recommend emailing the course staff (cse332-staff@cs) to request a one-on-one. When you email us, please include the following information:
  •   A brief description of what you'd like to discuss
  •   With whom did you previously discuss this (if applicable)?
  •   Your available times
  •   (optional) The name of your gitlab repo and whether you have unpushed diffs
Please be patient; we will try to respond with a timeslot within 24h of your request! Here is an easter egg for you to enjoy while waiting.

Communication with Staff & Peers

The course message board should be your first stop for questions about course content and assignments. Before posting, first check that your question has not already been answered on the message board, and if not, ask it there. We acknowledge and support the use of student-run Discords and will happily promote this on the discussion board, however, you will only get credit for participation on the Ed message board.

If it is not possible to ask your question on the message board without revealing details of your solution, please either use a private post on the message board or send email to cse332-staff at cs.washington.edu, which will go to the instructor and TAs. In general we prefer that you send questions to the cse332-staff list instead of to an individual staff member so that you will get a faster response time and the entire staff can remain aware of questions and issues. You will be automatically subscribed to the course email list if you are registered for the course and will be held responsible for anything posted there (only course staff will post to the course email list).

Finally, if you ever have something you wish to send to the staff anonymously, please do so with this link.

Late Policy
There are absolutely **no late submissions accepted for lecture activities, exercises, or assessments**. For project submissions, however, you will have **four (4) late days** to use over the course of the quarter on projects. Late days give you 24 additional hours to submit a project and **both partners must have a late day to submit a partner project late**. Any particular project may only be **48 hours late at most**. If unusual circumstances truly beyond your control prevent you from submitting an assignment on time, you should discuss this with the instructor or email the staff mailing list, preferably in advance.

Collaboration and Cheating
Learning these ideas is challenging. We encourage you to discuss course activities with your friends and classmates as you are working on them, because you will definitely learn more in this class if you work with others than if you do not. Ask questions, answer questions, and share ideas liberally; we want a class that is open, welcoming, and collaborative, where we can help each other build the highest possible understanding of the course material.
Learning collaboratively is different from sharing answers. You shouldn't be showing your code or answer to someone outside your group. A good rule-of-thumb for distinguishing between collaboration and sharing answers is this: *Can I attempt an immaterially-different question (eg, sorting in ascending order instead of descending order), by myself, without my collaborator?* If the answer is "yes", then you learned from your collaboration; that's great! Please do more of it! However, if the answer is "no", then you were sharing answers.
You are responsible for understanding and applying the department's Academic Misconduct Policy. If you are in doubt about what might constitute misconduct, send the course staff an email describing the situation and we will be happy to clarify it for you.

Inclusion
Our code and our projects are made better by considering a variety of viewpoints. Your course staff is committed to the values outlined in the Allen School's inclusiveness statement, and you are expected to uphold a supportive and inclusive learning environment.
If, at any point, you are made to feel uncomfortable, disrespected, or excluded by a staff member or fellow student, please report the incident so that we may address the issue and maintain a supportive and inclusive learning environment. Should you feel uncomfortable bringing up an issue with a staff member directly, you may consider submitting anonymous feedback.

Accommodations

Please refer to university policies regarding disability accommodations or religious accomodations.

More generally, we recognize that our students come from varied backgrounds and can have widely-varying circumstances. If you have any unforeseen or extenuating circumstance that arise during the course, please do not hesitate to contact the instructor to discuss your situation. The sooner we are made aware, the more easily these situations can be resolved. Extenuating circumstances may include work-school balance, illness, familial responsibilities, unexpected travel, or anything else beyond your control that may negatively impact your performance in the class.

Privacy

This course is scheduled to run synchronously at your scheduled class time via Zoom. These Zoom class sessions will be recorded for you to rewatch or for asynchronous students. The recording will capture the presenter's audio, video and computer screen. Student audio and video will be recorded if they share their computer audio and video during the recorded session. The recordings will only be accessible to students enrolled in the course to review materials. These recordings will not be shared with or accessible to the public.

The University and Zoom have FERPA-compliant agreements in place to protect the security and privacy of UW Zoom accounts. Students who do not wish to be recorded should:

- Change their Zoom screen name to hide any personal identifying information such as their name or UW Net ID, and
- Not share their computer audio or video during their Zoom sessions.