

Writing Schedule Sheets for CS3114

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The primary reason why students fail CS3114 is because they fail to complete the projects. And the main reason for not completing the projects is not because the student lacks the necessary programming skill (hopefully you couldn't have gotten this far if you didn't have the programming skill), but rather that many students have never learned adequate project management skills for dealing with projects of this size.

Project management (and the associated time management) is a skill, and it can be taught and learned. Like any skill, guided practice should lead to improvement. As part of this process of learning how to manage mid-sized projects that you will encounter in CS3114, we require all students to submit a series of schedule sheets with each project.

There are two parts to this document. The first describes the rationale for the schedule sheets and an “incremental” approach to program development. The second details the requirements for defining a satisfactory schedule and appropriately completing the schedule sheets. If you just want to see the requirements, then you can skip to the second section.

1 Rationale

We have been collecting schedule sheet data from students since 2006. It is quite clear from the data that there is a strong correlation between having completed a substantial fraction of a CS3114 project a week before the due date and the final grade on the project. At the same time, there is no correlation between how much got done in advance, and the total time devoted to the project in the end. Thus, there are no disadvantages (in terms of total time required) to starting early and spreading the work over time.

Of course, correlation does not determine a cause-and-effect relationship. Perhaps “good students” just tend to do things early as part of whatever mojo it is that makes them good students, in which case starting early doesn't “cause” a good grade. Fortunately, Dr. Edwards has also collected Web-CAT data that involves automated testing and code coverage. He has enough data to look at the results for students who did well on some assignments, and poorly on others. Those data show that these students did better on projects on which they started early than they did on projects where they did not start early. That is pretty conclusive proof that the act of starting early and spreading the work out **causes** good results.

Why would starting early lead to better results? One reason is that it keeps you from working under stress conditions. Programming is hard, and both design and debugging require a lot of focus. It is hard to do these things well when you are tired or distracted by stress. If you are in a situation where you are operating under bad conditions from spending lots of time right before the project is due, you can't do as well. You also do not give the “sleep on it” heuristic to work when you are working to a tight deadline. Many times a sticky design issue or a difficult bug need a “eureka” moment to get through, which are less likely to happen under pressure. Finally, if you need to get help on something (such as meet with the instructor or TA or get an answer from the forums), you might not have the time for that to happen the day that the project is due.

The other reason why many students cannot complete these projects comes from the “implement everything then debug” approach to project development. This just does not work well for projects of this size. The way to succeed is to build as small a core for the project as possible. Some piece

of the project that can be tested and debugged on its own. Then you add more functionality to the core, test it, and debug it. Continue in this manner until you have completed the project. That is an “incremental” approach to project development. That is much more likely to lead to success than “implement everything then debug.”

2 Requirements

The key to successful project management is good planning. The schedule sheets are meant to be a tool to make planning easy. Your goal is to create a schedule that lets you (and your instructor) see just what you have committed to do each day during the life cycle of the project. That requires enough detail to be clear. And the plan has to be realistic, so that you will stick with it. It has to fit your own particular circumstance: When you have time available, what is your own style of working.

Template Preparation The first thing you should do when developing the initial schedule sheet is to take a copy of the template and do the following:

1. The schedule sheet template was set up for partners. If you are not working with a partner, then remove the columns related to partners and reword the column headings appropriately.
2. Remove all of the instructions below the task list section. Those are not part of your plan.
3. Remove the tasks that were included as placeholders in the template. They aren't right for your project.

Initial Schedule Sheet The most important step is to define your task list. You cannot do that without a fairly complete understanding of the project requirements. Your task list should include everything that has to get done. Each task should be small enough that it can be completed in a day. Perhaps you will plan to get multiple tasks done on certain days. But no task should need more than a day. If a given task has a particular date associated with it, the intention should be to complete the task that day. The task list should explicitly indicate when testing/debugging will take place. Remember that you should be practicing incremental implementation, so testing and debugging should appear spread throughout the schedule.

Once you have defined all of the tasks, you should do your best to estimate how much time each task will require. Indicate times to the nearest half hour. Don't try to be more precise than that. Don't worry too much the first couple of times that you are not good at estimating this. Part of the purpose is to learn how quickly you can program. Most people have only a hazy idea about this. At the bottom of this column should be an estimate for the total number of hours needed to complete the project.

Finally, you should then draw up a schedule for completing the tasks. Take into account when you have time, when you like to work, etc. If you like to do most of the work on weekends, then allocate more tasks to weekends. If Thursdays are busy, then don't schedule to work on the project Thursdays. Be sure to re-order the tasks in deadline order, so that you can see just what needs to be done when.

Intermediate Schedule Sheet When you do your intermediate schedule sheet, you should not change anything that you put onto the initial schedule. You should be adding three new columns of information. (The exception would be if you find that you need to change the task list in some way.)

1. You should add a column that lists the amount of work that you actually spent on each task so far (to the nearest half hour). If you work with a partner, you would have two columns – one for each partner. At the bottom of this column should be a total for the actual number of hours spent on the project (to the nearest half hour).
2. You should add a column that lists the (possibly revised) deadline for any uncompleted task. You should indicate in this column which tasks are done. It should be obvious from the schedule sheet what tasks are yet to do.
3. You should add a column with a new time estimate for each task. This column indicates time *remaining* to complete the task. Tasks that are done should not get time estimates (again, one of the columns should indicate which tasks are done). At the bottom of this column should be an estimate for the total number of hours remaining to complete the project.

Final Schedule Sheet The final schedule sheet should not change any of the information from the intermediate schedule sheet. It should just add information. You should add a column that indicates the actual number of hours spent on each task. If you work with a partner, you would have two columns – one for each partner. At the bottom of this column should be an estimate for the total number of hours spent on the project.

Notes Below the table (where the notes in the original template were), you might want to include notes indicating anything special about the schedule. For example, if you will be on a trip for a week and cannot work on the project, that would be a good thing to note. Or if any task needs further explanation, it can go here. These notes can be added whenever they need to be, whether on the initial, intermediate, or final schedule sheet.