

CSCI 477a Project

40.0% of course grade

Introduction

Throughout your undergraduate studies, you have learned topics such as user interface design, GUI components, multi-threaded programming, networking, algorithms, and hopefully some special topics such as web programming, mobile programming, artificial intelligence, graphics, robotics, and many others. Up until this point, you have studied programming techniques, but you probably haven't learned about the entire process of software development. This project is going to expose you to working in a group on a large project from conception to deployment. You will need to utilize all of the topics you have learned throughout your studies in this project. During this semester, you will focus on documenting the project. In CSCI 477b next semester, you will implement the project.

Projects

Descriptions of the projects you will implement will be provided to you during the first or second lecture of the course. Some of the projects deal with outside stakeholders and others with internal stakeholders to the university. Regardless of the stakeholder, you must always keep in mind that the stakeholder is the ultimate authority and has the final decision on any and all project-related issues.

If all of the projects provided are filled by groups in the class, you are allowed to develop your own project description and have it approved by the professor. This will only be allowed if all of the project descriptions provided are filled by other groups. If approved, a grader, TA, or the professor will be assigned as the stakeholder for the project.

Description

You will be working in groups for the projects. The size of the group will be based on the size of the project. Each project description comes with a range of students. This is just a prediction of what I think each project will take, but since developing the detailed specifications comes later in the semester, you probably won't be able to determine the exact number up front. Groups will be assigned based on level of interest in each project. A description of how this will be accomplished is included in the Project Selection criterion in the Grading section.

Keep in mind that putting more students on a project will not necessarily decrease the amount of time it takes to implement the project. The additional communication overhead of more people on a project often increases the time to develop it. On the other hand, an understaffed project will lead to overworked programmers and possible delays in the project.

The specifics of the project will be determined through discussions with the stakeholder. As you are going through the software engineering process, the stakeholder will have to sign off on every document you produce. Some stakeholders may be very technical, and others may be more business-related. You will need to make sure the stakeholder completely understands your documents and accepts them. Part of your grade on the project is going to be based on feedback I receive from them.

In this course, you will have to submit documents to correspond to each part shown in the Grading Criteria section below.

Group Work

Part of the purpose of this project is to work together in a team. There will most likely be some issues within the team, and I hope that you all will work out the issues. If you are unable, please let me know, and I will mediate a discussion. In extreme cases, I will remove people from groups. I will then discuss with the student who was removed as to appropriate action. During the group presentation each member will showcase their contribution to the project. If you let your group do all the work, you will have nothing to show, and this will affect your individual grade. Ideally, everyone will in the group will receive the same grade on the project, but this is not a rule I will follow if it is obvious some members contributed more than others.

Documentation Requirements

You will need to abide by good object-oriented guidelines with your documentation. I am not requiring you to use any specific documentation standards, such as MBASE, CMM, etc., but if your stakeholder requires it, you will need to do it that way. Otherwise, you just need to submit the documents that I require in whatever format you choose.

Tips

Since there are a lot of parts to the project, you may be tempted to assign specific parts to specific people. This is fine, but it is important that everyone in the group reviews each part before submission. You should probably have an internal deadline of at least a few days earlier than the actual submission deadline so the rest of the group and stakeholder are able to review each document before submitting. Every member of the group should approve the document that is being submitted, and of course the stakeholder needs to approve it before the deadline as well.

Submission Instructions

All of the documents you create will be submitted via Blackboard. Please include a cover page for every part of the project that includes the project name, the stakeholder's name, the title of the document, and the name of every group member. Only one person per group should submit the document.

Grading Criteria

% of Final Grade	Criteria
1.0%	Project selection document
1.0%	Team Members and Meeting Times
2.0%	Project Roles
3.0%	High-Level Requirements
5.0%	Technical Specifications
7.0%	Detailed System Design
3.0%	Timeline and Cost Estimate
4.0%	Test Cases Document
2.0%	Deployment Document
10.0%	Presentation
2.0%	Complete Documentation

Description of Grading Criteria

All documents should be submitted as PDFs. We will be grading each document based on whether you have written it based on the type of document. We don't know the specific details you have discussed with the stakeholder, so I will also require the stakeholder to send me an email by the deadline confirming that you have implemented the document as he/she specified. This will factor into your grade on that part of the project.

All documents should be well-formatted, easy to read, and grammatically-correct. There should be no typos or sentence fragments. Please proofread your documents before sending them back to the stakeholder. Any and all communication with your stakeholder should be grammatically-correct and very professional. This will factor into your grade for all parts of the project.

As you are going through all of the documents that are required in the project, it is quite likely that some of the requirements will change or others will be added. Make sure to go back

through all of the previous documents on each phase and update them if anything has changed. You will submit all of the previous documents along with the new one at each deadline.

Project Selection

Submit the Project Selection form (which can be found on the Assignments page of the course web site) with a ranking of the projects on which you are interested in working. Each project should have a unique rank. Rank the project on which you want to work the most with a “1”, the next project on which you want to work with a “2”, and so on in increasing order. You will then be assigned a project and a team based on other people who would like to work on the same project.

If you would like to work on your own project, add that into the ranking. There is a place for “own project”. Name your project, and if you want to work with specific people on your own project, include their names. There is no guarantee that you will get to work on your own project since all of the projects with internal and external stakeholders will be filled first.

Team Members and Meeting Times

After being assigned a group, you will need to find a two hour block each week where the entire team is able to meet. Determine a location to meet. In addition, you will contact the stakeholder and set up an initial meeting with him/her and the entire team. Whether the meeting is via phone, video-conference, in-person, or some other means must be determined. The time, location, and attendees need to be submitted as well. Note that the meeting with the stakeholder does **not** have to have occurred before this phase has been submitted. Submit a document that includes all of the above information.

Project Roles

In a development team, there are different roles that need to be filled. These positions include project manager (to manage the timeline and tasks), chief architect, developer, quality assurance engineer (tester), technical writer (documentation lead), stakeholder contact (so the stakeholder doesn't have multiple members of the team contacting him/her), and others. Individual team members can take on more than one role, though you need to decide what roles are necessary for your specific team and project. Utilize the experience and strengths of your team members to place people into appropriate roles. For every role, you should have a primary member and a secondary member just in case something happens to the primary (i.e. someone drops the class). A good development strategy is to realize that everyone is replaceable with the proper preparation.

Submit a document with all of the roles for your project. You should have a description of the role for your specific project with the names of the people who will fill that role. Justify why you placed specific people into specific roles based on experience, desire to fill the role, project needs, etc.

High-Level Requirements

The high-level requirements contain an overall description of the project. The description you were provided initially could be called a “concept document.” The requirements will be developed through discussion with your stakeholder. There should be no technical details in this document unless they are essential to the project (i.e. develop a mobile iPhone app, create a web application, etc.). This document should contain everything the stakeholder wants implemented without the technical details. This document should be understandable to a non-technical person, and oftentimes it is written by a business person rather than a technical person.

The length of the document will be dependent on the size of the project. Your stakeholder needs to approve the requirements before the deadline. If your stakeholder has not approved them, you will receive a 0 for this part of the project.

Technical Specifications

The technical specifications will break the high-level requirements into specific tasks. You can have multiple levels of tasks, such as “Database Development” as a top-level task, followed by “Create Tables” and “Create Prepared Statements” as sub-tasks. Descriptions should follow for every task. The technical specifications are written by technical people for technical people, so do not merely duplicate the high-level requirements. If your stakeholder is not technical, you may need to explain verbally what is meant by the technical specifications, but do not compromise the quality or technical details in this document based on the knowledge of your stakeholder.

The technical specifications should not include design decisions unless they are critical to the project. For example, if you are creating a web application, the language does not need to be specified in the technical specifications. If, however, the stakeholder has told you that the application needs to run on Microsoft IIS, you may specify that in this document. That will of course determine what is included in the detailed system design.

You will submit both your high-level requirements document and your technical specifications document in this phase. Make sure you clearly delineate anything that you added, deleted, or changed in your high-level requirements. This can be accomplished using Track Changes in

Microsoft Word (or a similar feature in other word processors). Your stakeholder will need to approve both the high-level requirements again (regardless of if anything changed) and your technical specifications before submission.

Detailed System Design

The detailed system design is the document that will be provided to the programmers of the project. This document, coupled with the technical specifications, should be sufficient for a programming team to completely implement the project. This should contain a flow diagram, algorithms, an image of all screens (whether graphical or not), the database schema (ER diagram), the hardware/software requirements, class diagrams, inheritance hierarchies, etc. This will likely be a lengthy document.

You will submit the detailed system design along with the high-level requirements and technical specifications again, clearly delineating any changes in the previous two documents. Make sure your stakeholder has approved all three documents before submission.

Timeline and Cost Estimate

With the technical specifications and detailed system design completed, your team should be able to estimate the effort required to implement the project. You can implement the timeline in whatever program you like, though Microsoft Project is an industry-standard program. You need to determine which tasks are dependent on other tasks, how many hours are expected for each task, and how many developers should be dedicated to each task. A good rule of thumb is to break your specifications down into tasks that can be completed in fewer than 8 hours. If you have tasks that you estimate out to days or weeks, break it down into sub-tasks under a larger task heading. Smaller tasks are easier to estimate than larger ones. Then if a smaller task takes longer than estimated, your timeline will not be as inaccurate. Make sure you include all of the tasks that you already completed up to this point, such as the documentation and meetings.

After all of the tasks have been estimated with hours, you can assign rates to the different roles. Assume the following costs for these roles:

Project Manager	\$100/hour
Chief Architect	\$150/hour
Senior Programmer	\$100/hour
Intermediate Programmer	\$75/hour
Junior Programmer	\$50/hour
Graphics Designer	\$50/hour

Senior QA Engineer	\$100/hour
Junior QA Engineer	\$50/hour
Database Administrator	\$125/hour
Database Developer	\$75/hour
Technical Writer	\$50/hour

For other roles that you may have on the project, try to estimate a reasonable rate based on the above roles. If you have a question, ask your stakeholder or the professor/TAs.

Once you present the stakeholder with the timeline, some requirements may change. The entire project should be able to be completed within 4 months. This should mean that your team will be able to implement the project during the spring semester. If the timeline is longer than 4 months, you need to discuss what requirements need to be removed or pushed into a second phase of the project so you are able to successfully complete the project during the spring semester.

As with the previous parts of the project, you need to submit the high-level requirements, technical specifications, and detailed system design along with the timeline and cost estimate, clearly delineating any changes that were made in the previous documents. Your stakeholder must sign off on all of these documents before submission.

Test Cases Document

A good strategy for ensuring a program works correctly is to develop a set of test cases before or along with the implementation. Since we are pushing the implementation of the project into the next semester, you will need to develop your test cases before the implementation. There are many different types of test cases that we will discuss, including white box testing, black box testing, unit testing, regression testing, etc. You will need to make sure that you have a test case to prove that every technical specification is implemented correctly. Some of these test cases will be implemented in code next semester, and other test cases will be validated by a QA engineer running a test. For this document, you just need to define all of the tests that will be run to prove that the project was implemented the way it was supposed to be.

You will submit the high-level requirements, technical specification, detailed system design, and timeline and cost estimate along with the test cases document, clearly delineating any changes that were made in the previous documents. Your stakeholder must sign off on all of these documents before submission.

Deployment Document

The deployment document will include step-by-step instructions of what would need to be done to deploy the project in a production environment. For this document, assume that all of the code has been developed and tested – what happens next? There will most likely be some other configurations that need to be performed, such as including outside libraries, server settings, language includes, downloads, installations, etc. This document should be detailed enough so that a technical person who was not on the development team could deploy the application in a production environment.

You will submit the high-level requirements, technical specifications, detailed system design, timeline and cost estimate, and test cases document along with the deployment document, clearly delineating any changes that were made in the previous documents. Your stakeholder must sign off on all of these documents before submission.

Presentation

The presentation will be 5 minutes long with a few minutes for questions. During the presentation, you will create a presentation that explains the project, shows screenshots of it, and provides an overview of the timeline and cost. Imagine this presentation is being provided to the stakeholder and his/her bosses and executives. You will be trying to convince the group how wonderful the project is and that your group should be chosen to implement the project.

You will submit the presentation by the deadline, but no other parts need to be submitted. You should run the presentation by your stakeholder before submission, though no approval is needed. All of the stakeholders will be invited to the lecture where you will give the presentation.

Complete Documentation

You will put all of your documents together into one document, include a cover page, table of contents, and page numbers, and submit the entire set of documentation. This document should be nice enough that it could be printed and presented to the stakeholder of this project as the final document. This will be the document from which you will begin next semester to implement the project.

Provide either a printed copy or digital copy, whichever is requested, to the stakeholder by the deadline. If a printed copy is requested, make sure it is bound and presented professionally as official documentation. Only a digital copy is required to be submitted to Blackboard.