

*Supplemental learning service for software engineering students at  
Iowa State University*

A Proposal

by

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## 1. INTRODUCTION

### ***1.1 Purpose***

This document proposes the establishment of an online supplemental learning service for software engineering students at Iowa State University to aid in the mastery of software development languages, concepts, and practices that are common in real-world applications. Many software engineering students enter college with little to no programming experience, which has a great impact on their ability to comprehend their curriculum. In addition, many students throughout the course of their student progression struggle to apply material taught in their classes to more applicable real-world scenarios, which becomes an issue when they begin their job search after graduation. The creation of this technical description is necessary to help software engineering students succeed in their course material and future careers.

### ***1.2 Background***

Software engineering students at Iowa State University experience their first programming course as freshmen in Software Engineering 185: Problem Solving in Software Engineering (S E 185). In this course, students are introduced to the structural problem solving techniques that are required for their academic and professional journeys. When I was a freshman taking this class, students were required to work with a programming language called C, one of the oldest programming languages to date. It is also one of the most difficult languages to learn if you have no prior programming experience. During my time in this course, students were required to partner up in teams of two, so that the work was better distributed. The issue was that the skill levels of students had a wide range; some students had worked with programming languages previously in their lives, while others were coding for their first time. This would result in the more experienced students doing more of the work, since the less experienced ones were less proficient in their skills, which makes learning for them much more difficult. After this class, there are not many more that involve developing software in C language. StackOverflow, an online developer community where enthusiasts and professionals are able to ask and answer software-related questions, conducted their annual developer survey during the first half of 2019. The data revealed a list of the most popular programming languages that are used among developers. Of the 72,525 professional software developers that responded to this survey, 17.3% of them claimed C as their most used language, making it the 11th most popular programming language of 2019 (Stack Overflow). Because this is a rather outdated language, exposing students to this as their introduction to the world of programming not only seems counterintuitive, but it also can be very demotivational for students in wanting to continue learning the languages that are more applicable in future jobs.

### ***1.3 Scope***

This proposal suggests the creation of a supplemental, university-run, online learning hub for students to explore a variety of technologies in the software engineering realm, so they are able to expand beyond in-class knowledge. Every software developer has their niche; this service would allow students to discover what technologies they enjoy early on in their learning careers, so that they can become more specialized developers by the time they are ready to graduate. The online learning portal will have video tutorials created by Iowa State faculty, teaching assistants, and peer mentors; as well as tailored resources, practice exercises, and discussion forums to guide students through their schooling.

## **2. DISCUSSION**

### ***2.1 Approach***

This supplemental learning service platform for software engineering students will take its form as a website. This way, students will be able to access the service from many devices that have a secure internet connection.

Users will be required to login with their university email address and identify themselves as a student, teaching assistant, professor, or alumni. Once a user logs in, they will be greeted with a navigation menu containing four different sections that they will have access to.

The first section will contain official tutorials from university faculty and teaching assistants. Here, students will be able to watch and browse tutorials by topic, skill level, and popularity. There will also be a comment section for each video where further discussion may take place.

The second category, will contain articles and links to other reading materials that faculty, teaching assistants, and students have access to. Students will be able to further their knowledge through sources outside of the classroom; this will provide more variety in their conceptual learning skills. This will encourage students to fuel their curiosities by learning on their own, which can be more beneficial than being taught in a classroom.

The third section will contain exercises for students to test their skills by applying them through a more “hands-on” approach. Faculty and teaching assistants will be able to create mini quizzes to exercise general knowledge on programming topics; students will also be able to post programming challenges for their peers to solve. Solutions will be revealed after students have made their submissions. This will engage students’ problem-solving proficiencies, in addition to easing them into discussion with their peers on the topic.

The fourth section will have a discussion forum for faculty, teaching assistants, students, and even alumni; so that students can talk about things they are learning as well as ask questions regarding the professional software industry. This will allow students to practice their interpersonal skills to prepare for more professional setting in their future. By asking career-related questions to alumni, they can get an idea for how the industry transforms over time, so they can prepare themselves for technologies that may be more relevant in the future.

For each post made, there will be tags that users can attach to their posts, so that they can be more accessible to searching. Tags may be organized by skill level, technologies used, and other useful categories.

With these four sections, students will gain valuable knowledge that will help people of any skill level advance in their programming skills and prepare for their future careers.

## ***2.2 Result***

The result of this technical description will supply students with a strong resource to accompany their learning throughout the course of their college education. Students are able to work at a more flexible pace with this system, which allows for a stress-free learning environment. By having access to a variety of knowledge that is not directly discussed in their classwork, they will emerge as more well-rounded, passionate, and talented professionals in their lives after graduation.

## ***2.3 Statement of work***

Task 1: Search for professors and teaching assistants that are willing to participate in making tutorials for students, based on their focus of knowledge.

Task 2: Find an individual or team of developers that are willing to produce this web application.

Task 3: Find a team that is willing to conduct routine maintenance and moderation on the service to ensure that the service is being used properly and in accordance with academic policies of Iowa State University.

# **3. RESOURCES**

## ***3.1 Personnel***

This web application will require the acceptance and participation from professors, teaching assistants, and students at Iowa State University. The majority of this service will vary based on what professors and teaching assistants deem useful for students to learn, leaving the rest of it for the students to determine. As the platform grows, the variety of available information will also increase, but this is

based on user preferences. It will also require a professional web developer or a development team; in order to produce a user-friendly, functional, and feature-rich finished product within a given time frame. A team to conduct maintenance and moderate the content of the web app is not immediately required, but highly recommended to ensure the long-term stability of the platform through user feedback, updates, and bug fixes. They will also enforce Iowa State University's academic conduct policies so that no students are using the platform to commit acts of academic dishonesty.

### ***3.2 Facilities/equipment***

A server will be required to host the website, which can be done either through Iowa State University or a third party company. All users will need a secure internet connection and a web browser to use the service on a laptop or desktop computer.

## **4. COST**

### ***4.1 Fiscal***

The professional web developer and maintenance team will need to be paid for; the cost for these resources should come at a fixed cost, with little to no additional funding required. Periodic payments to the maintenance team will be needed for continuous moderation of the platform, for as long as Iowa State University deems appropriate.

### ***4.2 Time***

There are many variables that will determine the full implementation of this system at Iowa State University. The deployment timeline of this description will depend on the available resources at the time of production. Once the application has been built, the amount of time it will take to fully integrate with the academic ecosystem of Iowa State University will depend on the initial amount of professors and teaching assistants that put out content for the platform. For estimation purposes, this project could take anywhere from 3-24 months for it to be complete. It will demand a sufficient amount of users for the platform to be successful.

## **5. CONCLUSION**

### ***5.1 Summary***

The proposed supplemental learning service for software engineering students at Iowa State University will ultimately better prepare students for their future work opportunities after college. Students from any level of proficiency will be able to further their problem-solving abilities at their own pace, in any programming discipline they desire. This platform will facilitate curiosity in students and make them eager to maximize their potential as software developers. By creating a relaxed learning environment

for students to explore their field of study, they will be more likely to enjoy the work they do; this will make them more driven, passionate, and ambitious software developers for the future industry.

## 6. CONTACT

I am very excited about the development of this platform and happy to answer any questions.

For more information, please send me an email at *morellas@iastate.edu*

### Works Cited

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