University of Puerto Rico Mayagüez, Campus
Faculty of Engineering
Department of Computer Science and Engineering

[INSO4117] Software Testing

Team 7: TutorFinder

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I. Informative Documents

1. Name, Place, Date
    a. TutorFinder, Mayagüez PR, February/12/2021.
2. Current Situation
    a. When students have difficulties understanding their coursework they resort to getting help from tutors because the teaching is individualized and specific to the student. Due to the global pandemic, the accessibility and reachability between tutors and students is decreasing. This is a problem because 28.39% of students have used group tutoring before and 17.76% of students with a full-time job have used online tutoring from or at their college. The pandemic is causing tutors to lose marketability because they are not able to promote their services on campus and there is a lack of an organized platform in which tutors can promote their services online. Also, there is no system that specializes in helping students search for tutors that have qualifications to aid them in their problem areas.
3. Needs
    a. Tutors need a place to market their services based on their education, hourly rates, and the type of tutoring they give. There also needs to be a simple way to search for tutors based on the criteria the student is looking for. We would need to create a service that can prove to be useful to users even when the pandemic is over. This would also speed up the process of contact between students and tutors in order to minimize interpersonal contact.
4. Ideas and Concepts
    a. The main idea is to create a web application to facilitate communication between students and tutors. This application will allow tutors to list information relevant to their services in their individual profiles. These profiles will allow students to view the information displayed and thus allow them to have the option to contact the tutor for their services. Additionally, the application is intended to assist the tutor in saving time by decreasing the need to market their services in public spaces. Tutors will be able to share the knowledge they have been gathering with students that need help with their course work. There would be search functions to facilitate students with finding tutors based on their preferred criteria. This criterion would include courses, time availability, hourly rates and if the service would be individual or with a study group.
5. Scope
    a. The complete understanding of tutoring services, meeting scheduling and levels of educational subjects.
6. Span
    a. The creation of a network of students and tutors in a particular institution that can help the students receive the help they need for their courses and achieve academic excellence.
7. Synopsis
    a. The goal of the project is to develop a community of tutors and students from a domain description to an implementation that helps create connections between interested parties, being a student searching for a tutor or a tutor expanding their clientele. The domain model is expected to cover phenomena such as: tutor

information, its descriptors being subject, schedule, fee, and contact details. Students can browse by subject and see the tutors that are available for each one.

8. Assumptions and Dependencies
    a. Assumptions:
        i. Tutor assumptions:
            1. The tutors that are registered is expected to have the knowledge they portrait in their profile.
            2. The tutors are expected to only help the student not to do their homework, exams, projects, or any other assessment that might lead to dishonesty.
        ii. Student assumptions:
            1. Students will be searching for help from tutors to clarify their course doubts.
        iii. Seasonal traffic:
            1. It is expected that when the courses are reaching midterms or finals the website encounters high traffic of users.
            2. It is expected that the tutors will be very busy during this time.
    b. Dependencies:
        i. Tutors depend on the workflow of the courses that each student is. If the tutor wants to tutor a common course his workload will be higher, meaning that the dependency for a student is lowers. While in more advance courses the dependency of a student is significantly higher since community of students of advances courses are significantly lower.
        ii. Tutors traffic depend on the reviews of students, higher reviews will lead to higher traffic for the tutor.
        iii. Students depends on the availability of the tutors and/or if the tutor will proceed with the tutoring with the student.
9. Implicit/Derivatives Goals
    a. Primary Goal: Develop a web application for students to find tutors in the shortest possible time. Includes a platform within the web app for tutors to market themselves, reducing the time of connecting a tutor to a student that needs help.
    b. Driving Goal (drives primary): Add more time for students to study and learn the course material given, helping improve their grades and academic knowledge.
    c. "Side" Goal (nice-to-have): Add a rate and review section of tutors to improve and ease the searching of tutors for students.

II. Descriptive Documents

1. Descriptive Rough Domain Sketches
    a. First, we need to make a distinction between the two types of users, Tutor and Student. Firstly, tutors are individuals looking for a space to market their tutoring services. They would be allowed to have accounts with profiles where they would list relevant information such as their education, availability, location, hourly rates and courses they specialize in. On the other hand, students would have accounts that allow them to search for tutors and send them messages to solicit their services. The domain would include functions such as: Search for tutors, becoming a tutor and sending a message. Search for a tutor would be an event described by the

student looking up tutors based on their preferred criteria. Becoming a Tutor would be an event where the user is able to identify themself as a tutor and thus is able to upload their information and make it available for other users to search. Sending messages would be an event where the user, in this case a student, sends a message to a tutor. Finally, it is expected that this platform will help students find tutors that will aid them with their college courses without having to meet in person, as well as promote tutors that would benefit economically and professionally from giving tutoring.

2. Descriptive Domain Narrative
    a. TutorFinder will be a web application for students and tutors. Students and tutors will have different types of accounts with specific functions. A student will need to create an account with the essential information that includes university or college details to contact any tutor that he or she wants. A person that wants to be a tutor will need to be qualified to create an account depending on their knowledge and skills. Additionally, the tutor will need to specify his or her available hours and hourly rate, besides the essential information required to create an account. Afterward, a student can search for a tutor depending on their necessities, university or college they attend, and its courses, and contact the tutor that suits them. The tutor will reply and settle an agreement with the student for the best possible time and, if not online, a location to meet. After the study session, the students can write a review and rate the tutor depending on their experience. The rate and review could help the tutor to be more trusted among other students and help facilitate their decision for a tutor.
3. Descriptive Domain Terminology
    a. Tutor: a person that assists in the teaching of a specific topic given on a course to help a student understand the topic.
    b. Student: a person who is studying at a university or college to be able to work in a particular profession.
    c. University: an educational institution that teaches, grants undergraduate and graduate degrees, and provides facilities for academic research to students.
    d. College: a smaller educational institution that teaches and only grants undergraduate degrees to students.
    e. Profession: a type of work that requires a specific set of knowledge or skills.
    f. Course: a series of lessons or lectures on a particular subject. (Collins Dictionary)
    g. Course Code: a set of letters and numbers that represent a course that is being given at a university or college.
    h. Subject: a branch of knowledge being taught in a university or college. (Oxford)
    i. Review: a report or comment in which someone gives an opinion or critic about their experience with the tutor.
4. Domain Entities
    a. Person: a human being.
        i. Attributes:
            1. Name
                a. First name
                b. Last name
            2. Age

3. Nationality
4. Email
5. Phone number
6. Description

ii. Specialization

1. Tutor: person that helps one or more persons in different subjects.
    a. Level of education
    b. Certifications
    c. Quantity rate: rate on how much currency the tutor will be charging for his/her services.
    d. Time rate: frequency of how much times (year, month, week, day, hour, minute, etc.) the tutor will be charging.
    e. Overview/description: text describing the qualities of the tutor.
2. Tutee

b. Address: location of a person(s) or directions of a thing or place.

i. Attributes:

1. Zip code
2. Street address
3. Country
4. State/municipality

c. Meeting: an agreed upon location where more than one person attends to have a particular discussion.

i. Attributes:

1. Modality: form of how a meeting would be carried out.
2. Location: address or platform where the meeting will take place.
3. Participants: number of persons that will be in the meeting.
4. Date: moment in the calendar the meeting will be held.
5. Time: moment within a day the meeting will be held.

d. College/University: educational institution where a person can obtain an academic degree(s).

i. Attributes

1. Precinct

e. Subject: a branch of knowledge.

f. Level of education: amount of preparatory knowledge of a subject.

5. Domain Functions

a. Tutoring (Tutor, Tutee[], Subject, Meeting):

i. To perform the action of tutoring of a common subject to one or many students, yields the total amount the tutor will charge to every student that participated in the meeting.

b. Schedule Tutoring Meeting (Tutor, Tutee, Subject):

i. A tutee contacts the tutor that gives tutoring services of the given subject, if they get into an agreement, they proceed to schedule a tutoring meeting. Otherwise, no meeting could be scheduled.

    c. Search for Tutor by Subject and Level of Education (Subject, Level of education):
        i. A person finds the need to search for help on a particular subject, e.i. another person (tutor) that can help them understand the material. This function yields a list of possible tutors that can give tutoring for that subject for the specified level of education.
6. Domain Events
    a. Student wants a tutor
        i. The student is struggling with a course and does not want to fail, so they want to hire a tutor to help them pass the class.
    b. Student connects with tutor
        i. The student messages the tutor, they make a study plan and negotiate hourly rate and payment options.
    c. Becoming a tutor
        i. A person identifies themselves as knowledgeable on a subject and considers themselves qualified to teach. The person identifies themselves as a tutor of one or various courses of a particular educational institution and provides help to students in need.
    d. Not finding help
        i. The student needs help understanding the material of a class yet cannot find a tutor.
7. Domain Behaviors
    a. Recommending a tutor
        i. After the student has hired the tutor, if they had a favorable experience, they may recommend their contact to people they know.
    b. Tutor refuses student
        i. The tutor may be overworked or short on time, therefore rejecting a student's need for help.
        ii. The student does not comply with the payment agreement and the tutor refuses to give lessons to the student.
    c. Bad review from student
        i. The student received incomplete, inaccurate, or unhelpful lessons from a tutor and shares their negative experience with others.
        ii. The student paid the tutor for a certain amount of time and lessons and the tutor did not uphold their end of the deal, leading the student to leave a bad review.
8. Stakeholders & Personas:
    a. Tutor (tutor)
        i. Sebastian Mendoza (24 years)
        Sebastian is a senior college student pursuing a Bachelor's in Chemistry in the University of Puerto Rico Mayagüez. He is very bright and has excellent grades, especially in the chemistry courses. Loves to learn and help others if they are having trouble with their courses. Usually, he gathers with his friends, form a study group, and gives tutoring to them. Very good with math and chemistry. He uses the university's bulletin board to sponsor himself by setting up flyers with his contact info, services, and charge rate. But only gives tutoring to a few students from the university.

ii. Maria Del Mar (23 years)
Maria is a graduate student that has a Bachelor's in Physics and is pursuing her Master's in Particle Physics and doing her thesis. She is a dominant all-around physics student, perfect fit for being a tutor. She uses social media to sponsor herself for tutoring. Some students have contacted her for tutoring, but they are all far away. She doesn't have a car and really needs the extra financial aid to cover her studies and needs. She wishes to schedule tutoring to an amount of students that she can manage while having the extra income and doing something that she loves.

b. Tutee (tutee)
   i. Mateo Jimenez
   Mateo is a freshman at the University of Puerto Rico Mayagüez. In high school, he was at the top of his class and his parents always told him he was incredibly smart and special. He seemed to have no issue managing soccer practice, school and even had a great social life. Mateo's luck changed drastically in his first semester at college. Classes were harder than he expected, and he soon questioned everything that was said to him in his childhood and wondered truly how "smart" he was. After expressing his concern to his roommate, Mateo decided that there is no shame is seeking help and he set out to find a Math tutor to help him pass his Calculus class.
   ii. Lisa Simpson (political science) (20 years, pursuing a bachelor's Political Science) (Estefania)
   Lisa Simpson is a political science student about to graduate from her bachelor's degree. Simpson led the 2020 political campaign for the PIP party in Puerto Rico and she likes to dedicate herself to investigative journalism. Lisa excels in everything to do with political science, but prior to graduating, the university is requiring her to take a science elective and she chose physics thinking it would be simple. Failing this physics class will cause her to stay an extra semester, and having her dream job secured, failing is not an option. She will hire the best tutor she can find to help her pass this class.

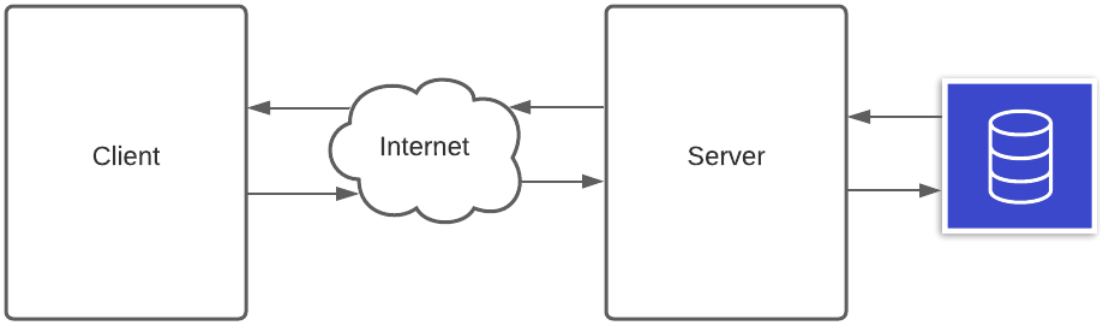
c. Professor (tutor)
   i. Paul (math) (54 years, Dr.) (Carlos)
   Paul Smith is a retired math professor. He loved teaching college students about the wonders of mathematics but was forced to retire. He still wants to help students understand complex concepts of mathematics, while helping them improve their grades. Additionally, he wants to earn some extra money by spending time doing what he loves. Therefore, when he discovered TutorFinder he created an account right away and set an affordable hourly rate for college students. Now, tutoring has become a part time job for Paul. He can teach and tutor college students without the workload of being a professor.

d. Instructor (tutor)
    i. Jane (29 years)
    Jane majored in English with the dream of being a published author but now she is not very sure that is the path for her. She thinks she will know what to do after finishing her Master's. She is trying tutoring to see if being a teacher, or even a professor, is the path she is meant to take. So far connecting with her students has been a fulfilling experience for her, and the extra money is nice. Or maybe this is just the distraction that she needed to get her out of her writer's block and inspire the novel that will make her the literary star hat she dreams of becoming.
e. Student (tutee/tutor)
    i. Sally (business) (21 years, pursuing a bachelor's in Business)
    Sally is pursuing a Barchelors Degree on Business and is currently on her third-year at the University of Puerto Rico, Rio Piedras. She has a large following on social media and is looking how to market that audience by taking courses related to business. She has strong comprehension with anything related with numbers. Her problem is the most in dept subjects of business and wants to have everything clear to go hands on her personal brand. She would like to work on a big media company on the business side. Tutoring would help her since she is very strict with her time and do not want to fail or lose time by not comprehending at first the subjects.
    ii. Kevin Ramirez (22 years)
    Kevin is a mechanical engineering student at the Polytechnic University of San Juan. He is having trouble understanding his Fluid Mechanics class. Therefore, he is looking for someone that can help him understand the topics before his next test. Kevin has a good resume with multiple extracurricular activities, such as being the president of his college's American Society of Mechanical Engineers chapter, but his GPA has been affected by bad grades in the past because of the number of responsibilities he has outside his classes. Thus, with tutoring he will also look to improve his Major GPA in order to get an offer at his dream job at Boeing.

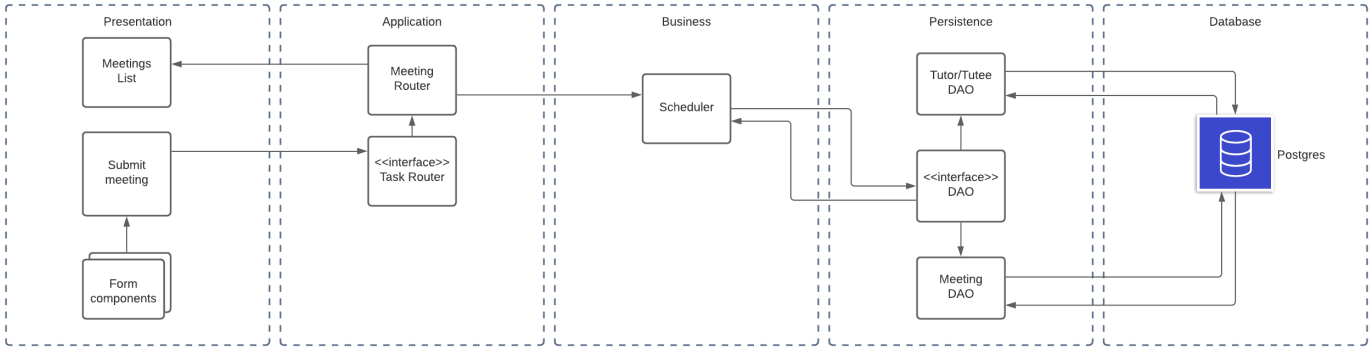
9. User Stories:
    a. As a tutor, I want to:
        i. share my knowledge to other people.
        ii. display my knowledge capabilities so people can trust me as a trustworthy source of information.
        iii. learn/practice how to give out lectures to multiple people.
        iv. be able to have another source of income.
    b. As a tutee, I want to:
        i. search for a capable tutor to help me on my difficult subjects.
        ii. find a different perspective of the subject's material.
        iii. understand the subject to pass the course.
        iv. find economic alternatives that can help me on my education.

10. Domain Requirements
    a. Search for a Tutor.
        i. Students can search for a specific tutor based on the subject/course in which that tutor is specialized. There the user can gather all the information needed such as availability, course orientation, background of work, etc.
    b. Bulletin Board Search
        i. Students can find, without the need of searching, different tutors that provide their services. The board does not have a preferred implementation, meaning that the tutors that are displayed are completely randomized to create exposure for each tutor.
    c. Tutor & Student agreement
        i. Both users need to create a conversation via direct message to arrange the needs of the students according to the availability and specifications of the tutor.
11. Interface Requirements
    a. Tutor shared data requirement
        i. Each user must have access to all the tutors that are available/registered. Any availability or changes to the profile of the tutor must be updated.
    b. Tutor shared reviews data requirement
        i. Reviews must be constantly updating once a user/student has given one. This is to provide a constant flow of up-to-date feedback to provide credibility to the tutor.
12. Machine Requirements
    a. Performance
        i. The machine's average response time shall be at most 1.6 seconds, when the system is on a heavy load.
        ii. The machine should serve 500 common and 200 verified users, a total of 700 users.
    b. Dependability
        i. The machine should always be accessible for users. Every user should have the appearance that s/he has exclusive access to the system.
        ii. The machine shall always be available, except when under maintenance.
        iii. The machine shall encrypt all stored user sensitive data (passwords, etc.).
    c. Maintenance
        i. The machine's average time between failures shall be at least 30 days, and downtime due to failure shall be less than 3 hours.
    d. Platform
        i. The machine shall be developed on a UNIX operating system.
        ii. The machine shall be compatible with all the libraries and 3rd party software for correct execution.
    e. Documentation
        i. We shall provide installation, support, user, contribution, and development guidelines.
13. Software Architecture Design
    a. Client/Server Architecture

i. We will follow the client/server architecture, where there will have one client and one server. The client will serve the “front end” and the server the “back end” part of our system.

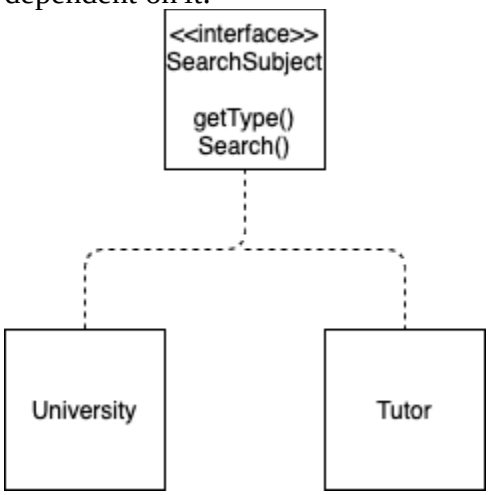


b. Layered Architecture Design (5-layer)
The Layered Architecture Design Pattern will help us maintain modularity and test out functionality easier.
   i. Presentation Layer
      1. Contains all the visible components (UI/UX) for the client to interact with the system.
   ii. Application Layer
      1. Thin layer in between the client and server. In the client side, it will redirect and be able to communicate successfully with other UI components and the server for the required service. In the server side, it will delegate and direct requests to use the correct function/endpoint for further processing. Also, will do error checking and a thin layer of security.
   iii. Business Layer (Domain Layer)
      1. Will contain all the functionality of data processing and system logic corresponding to the task.
   iv. Persistence Layer
      1. Will contain the set of logic that will communicate with the database for inserting, updating and deletion of data.
   v. Database Layer
      1. The underlying database technology.



This is a simple and incomplete Layered Architecture model of our system.

14. Software Component Design
    a. Principles
        i. Design by Contract: It denotes that the relationship between the class and its clients constitutes an agreement. In this case, if the user searches for tutors that contain the property of Subject=“Linear Algebra”, then the Search List agrees to contain only tutors that provide tutoring for the specified class.
        ii. Open-closed Principle: This principle establishes that there should always be room for the extension of a module, but the module should be closed to modifications. For example, a SearchSubject interface. Here, it is ideal to keep adding classes that implement SearchSubject, yet it is not ideal to modify the SearchSubject interface when various classes are already dependent on it.



    b. Identify and Elaborate Classes
        i. Student – has properties like username, password
        ii. Tutor – has properties like name, rating, university, subject list, schedule, tutoring fee, contact details
15. Selected Fragments of Implementation
    a. Nothing yet.

III. Analytic Documents

a. Concept Formation
    i. There are the concrete phenomena of universities and community colleges. We abstract these concepts into one representation: higher education institutions.
b. Validation
    i. Have external meetings with both stakeholders and domain engineers to discuss positively and/or negatively and review together the domain and requirement model and all documents produced so far to point-out: inconsistencies, incompleteness, conflicts, and description errors.
c. Verification
    i. Ensure that the structure of the Institution includes a list of courses, without duplicate course codifications, and that inside each course is a list of available tutors for that class. The same course codification can be repeated only if the Institution is different.

IV. Roles

For each sprint, we will have a different Scrum master by each member taking turns. The role will be given to the member that has the most availability for the sprint.

I. Client (front end):
    a. Estefania Torres (team leader)
    b. Frances Ramos
    c. David Carrion
    d. Carlos Torres
II. Server (back end):
    a. Everson Rodriguez (team leader)
    b. Christopher Vegerano