Requirements, Constraints, and Engineering Standards

Group 15

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Problem Statement

Students in beginner programming classes at Iowa State University frequently have questions about their programming assignments. Since these questions are often repetitive and asked at odd hours of the day, it can take professors many hours to respond. This delay disrupts learning and frustrates young students. From the professor's perspective, taking the time to help each student consumes time from an already filled schedule. The Discord Bot project attempts to answer student questions immediately, without the need for professor interaction.

Functional Requirements

- If the student request requires remote resources, the Discord Bot shall show a loading message while it formulates an answer to the query.
- The Discord Bot shall respond to a student within five seconds.
- The Discord Bot shall be configurable on a class and assignment basis.
- The Discord Bot shall be able to download up-to-date student code from Replit.
- The Discord Bot shall be capable of the following:
  - Executing tests on the student code.
  - Providing helpful hints to students based on compiler error messages.
  - Providing instructions for a given assignment.
  - Allowing students to ask pre-configured questions for a given assignment.
  - Forwarding a student interaction to teaching staff if the bot is unable to assist.
- The teaching staff shall have an easy to use interface for updating the bot.
- The Discord Bot will be able to converse with multiple students at a time.

Resource Requirements

- The project must be completed by the end of Iowa State University's fall 2023 semester.
- The project deployment infrastructure must be capable of running on Iowa State University Virtual Machines.

Qualitative Aesthetics Requirements

- All snippets of code sent by the bot as examples will be written with correct formatting and spacing to improve readability.
- All bot responses will be easy to understand and formatted in an appealing and organized manner.
- All links will be ready to use and click and not not require copy and pasting into the search bar.

UI Requirements

- The messages sent by the Discord Bot will support using emoji reactions for positive/negative feedback.
- The Discord Bot will be capable of escalating the student's request to a professor if its first attempt receives negative feedback.

Engineering Standard #1

ISO/IEC/IEEE International Standard - Software and systems engineering --Software testing --Part 1: General concepts

- System testing
- Unit testing
- Integration testing
- user-acceptance testing

Engineering Standard #2
ISO/IEC/IEEE International Standard - Systems and software engineering -- Design and development of information for users

- Information users need
- Specific information to be presented
- How to prepare information
- How to make information available

Engineering Standard #3

ISO/IEC/IEEE International Standard - Software and systems engineering -- Software testing -- Part 5: Keyword-Driven Testing

- Extensive testing of keywords and phrases
- Reference approach to implement keyword-driven testing
- Defining requirements on frameworks
- Test specifications
- Create frameworks
- Build test automation

Intended Users and Uses

- CPR E 161 students
  - quick access to coding resources
  - access to prior questions and answers
  - decreases time spent waiting for instructor assistance

- CPR E 161 instructors
  - eliminate time spent answering repetitive questions
  - configurable bot FAQ
  - notifications for escalated questions

Use Case Example