School of Computing

Year 4 Project Proposal Form

SECTION A

Project Title: CoderDojo Zen Projects

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SECTION B

Proposal Description

General area covered by the project

This project generally covers runtime support for various programming languages in a browser environment within the existing architecture of the CoderDojo Zen platform with a focus on showcasing youth's projects on the platform through discovery and interaction. This will be abstracted in such a way that adding support for runtime of more languages in the future will be relatively easy and the environment I create will be usable in other applications outside of Zen.

Within the scope of the project I will be supporting runtime for Scratch, Python and JavaScript projects with the possibility of supporting Java as a stretch goal. These projects will also have versioning, allowing them to be rolled back to previous versions if need be.

Outline of the proposed project

- Background

  In 2015, the CoderDojo Foundation (CDF) built the CoderDojo Community Platform which aims to provide the CoderDojo community with infrastructure to run their Dojo and to connect the global CoderDojo community.

  One of the core features for 2017/2018 that they would like to add to the platform is the projects functionality. This is a youth orientated and targeted feature which allows young people to upload projects and share with the CoderDojo community through their own profile and their Dojo.

- Achievements

    - **Showcase youth projects:** Projects created and uploaded by youths will be available in an interactive form on their profile pages, Dojo pages and other pages on Zen. They will also be showcased in the form of photo galleries.
    - **Project versioning:** Projects will have versioning using an existing version control system (VCS). I am looking into using GitHub which appears to be suitable for this purpose.
    - **Progress tracking and statistics:** Parents and Mentors will be able to more easily track the progress of youths through viewing their projects and also use these projects as evidence for awarding digital badges. For the CDF, more statistics will be made available through an “admin panel” relating to the use of their content in projects.
    - **Improved learning resources:** Projects will be grouped using tags by language, sushi card, Dojo and region in order to provide better examples to users looking to work on their own projects or learn particular languages.
    - **Project management and sharing:** Parents, Mentors, Champions, youths and the CDF will all be able to manage projects in different ways. Projects can also be shared to various social media by any users of the site provided the youth has allowed this in their project settings.
    - **Stretch Goals:**
        - Runtime support for Java projects.
        - Automatic feedback for youths based on their project code.

- Justification

    The ability to showcase projects on Zen is something that the CDF sees a lot of value in for their users, especially youths. With support for interactive Scratch, Python and HTML, CSS and JavaScript projects (and possibly Java) being implemented by me, the CDF will hopefully be able to easily build on this in the future to support even more languages. This will allow youths to share even more of their creations in the future.

    While the project is mainly aimed at youth “Ninjas”, it also has benefits for other members of the CoderDojo community such as Parents and Mentors who will be better able to track progress of youths and show evidence for awarded digital badges. The CDF themselves will also see benefits for their own statistics and onboarding more community members onto the platform to share their creativity.

Programming language(s)

- JavaScript
- Scratch
- Python
- SQL
- Java (possibly)
- GraphQL (possibly)

Programming tools / Tech stack

- VueJS
- AngularJS
- NodeJS
- SenecaJS
- HapiJS
- PostgreSQL database
- Brython (possibly)

Learning Challenges

- **Runtime:** I will need to implement the running of Scratch, Python and possibly Java code in a browser within Zen's existing architecture and abstract it enough that more languages can be easily supported in the future. I'm looking into using Brython as a possibility for running Python code but further research needs to be done into how I will support Scratch. Scratch 2 and earlier are Flash based but the new Scratch 3 (unreleased) is HTML5 based. Since the release for this is imminent I cannot yet make the decision on whether to support Scratch 2 and earlier or not. For Java, I am looking into possibly wrapping the code in an Applet.
- **Project versioning:** Project files will need to be hosted under specific accounts under the CoderDojo organization using the API of an existing VCS (Likely GitHub GraphQL API v4).
- **Scratch, Python & GraphQL:** I have no prior experience in using Scratch, Python or GraphQL (which I will need to use If I choose to use the GitHub GraphQL API v4)
- **Security issues:** There are security issues here which have to be dealt with regarding inappropriate content or language and/or malicious code in projects. I haven't dealt with these types of issues before on such a scale.

Hardware / software platform

Fedora 26 on a Hewlett-Packard laptop with an Intel i7 processor and 8GB RAM.

Special hardware / software requirements

None.