Individual Project (CS3IP16)

Department of Computer Science
University of Reading

Project Initiation Document

PID Sign-Off

Student No.	**24026478**
Student Name	**Joseph Fazzino**
Email	**joseph@fazzino.net**
Degree programme (BSc CS/BSc IT)	**BSc CS**
Supervisor Name	**Hong Wei**
Supervisor Signature	
Date	**1/10/18**

SECTION 1 – General Information

Project Identification

1.1	**Project ID** (as in handbook)
	Own
1.2	**Project Title**
	Using Containers to Isolate Remote Code Execution for an Online Development Environment
1.3	**Briefly describe the main purpose of the project in no more than 25 words**
	Create a system which allows anyone with a browser and an internet connection to get started coding

Student Identification

1.4	**Student Name(s), Course, Email address(s)** e.g. Anne Other, BSc CS, a.other@student.reading.ac.uk
	Joseph Fazzino, BSc CS, j.fazzino@student.reading.ac.uk, joseph@fazzino.net

Supervisor Identification

1.5	**Primary Supervisor Name, Email address** e.g. Prof Anne Other, a.other@reading.ac.uk
	Dr Hong Wei, h.wei@reading.ac.uk
1.6	**Secondary Supervisor Name, Email address** Only fill in this section if a secondary supervisor has been assigned to your project

SECTION 2 – Project Description

2.1	**Summarise the background research for the project in about 400 words. You must include references in this section but don't count them in the word count.**
	In order to create this system, much research must be undertaken that looks at technology such as real time communication methods, for rapid communication between the front-end of the project and the backend. Technology that can enable code to be executed on the server in a safe and secure way, and, technology in which to build that system in terms of languages and tools. Real time communication is essential for a fast feedback loop between the client and the server when something is trying to emulate the experience of having something working locally. HTTP polling

has been researched HTTP polling is an attempt to solve the real-time issue by repeatedly making a request to a web server at a pre-determined time interval to check if there are messages waiting to be read. HTTP long-polling is another solution that uses the HTTP protocol but reduces the number of requests by having the server intelligently not respond to the request if there is no data available and hang until a timeout or information becomes available. A modern solution to the issues of HTTP polling is the WebSocket protocol proposed in RFC 6455 [1] which aimed to reduce latency by a factor of three compared to HTTP in the real-time communication aspect. It is a full duplex, bidirectional communication channel that provides an efficient method of communicating between several different clients using a persistent connection between the client and the server.

Repl.it is very similar to the idea proposed and contains many features parallel with this project. It offers a large array of Repl templates available for users to get started with many languages/frameworks very quickly. It also uses the Monaco Editor provided by Microsoft in order to provide a first class text editor experience.

References:
[1] The WebSocket Protocol

2.2 **Summarise the project objectives and outputs in about 400 words.**
These objectives and outputs should appear as tasks, milestones and deliverables in your project plan. In general, an objective is something you can do and an output is something you produce – one leads to the other.

The overarching objective of the project is to create an environment where users can come online and work on a project within their browsers and without the need to install anything are listed below.

1. Create a platform where users can write/execute code
2. Give every user their own personal environment
3. Eliminate the need for locally installed tooling

Broken down into smaller objectives:

- The platform should be as user friendly as possible. In order to create a user-friendly application, the software should adhere to already existing design axioms and leverage common user behaviour psychology.
- The platform should be able to handle basic coding compilation and return the result to the user in a clear way.
- The web app should be highly performant. There are numerous studies showing that non-performant web applications do not retain users and provide extremely frustrating user journeys. Google Chrome has an inbuilt lighthouse tool that checks performance of the website across different mobile network speed simulations and I aim to be in the top 10 percentile.
- The environments of the users must be completely isolated from each other
- The exercises must be displayed in a way that is clear what the user has to do and how they are to run the code they've written

2.3 **Initial project specification - list key features and functions of your finished project.**
Remember that a specification should not usually propose the solution. For example, your project may require open source datasets so add that to the specification but don't state how that data-link will be achieved – that comes later.

	1. Create a platform where users can write/execute code 2. Give every user their own personal environment 3. Eliminate the need for locally installed tooling 4. The platform should use industry standard tools
2.4	**Describe the social, legal and ethical issues that apply to your project. Does your project require ethical approval? (If your project requires a questionnaire/interview for conducting research and/or collecting data, you will need to apply for an ethical approval)**
	There are some concerns with the project's output when it comes to the social, legal, health and ethical issues. Socially, the fact that it's an online environment means that someone with limited internet connection or even intermittent internet connection will struggle to use the site reliably and adequately replace a local development environment. This issue could be mitigated if the website was converted to a progressive web app which would enable offline functionality.
2.5	**Identify and lists the items you expect to need to purchase for your project. Specify the cost (include VAT and shipping if known) of each item as well as the supplier.** e.g. item 1 name, supplier, cost
	Not applicable
2.6	**State whether you need access to specific resources within the department or the University e.g. special devices and workshop**
	Not applicable

SECTION 3 – Project Plan

3.1	**Project Plan** Split your project work into sections/categories/phases and add tasks for each of these sections. It is likely that the high-level objectives you identified in section 2.2 become sections here. The outputs from section 2.2 should appear in the Outputs column here. Remember to include tasks for your project presentation, project demos, producing your poster, and writing up your report.

Task No.	Task description	Effort (weeks)	Outputs
1	**Background Research**		
1.1	Reading resources on similar problems regarding tutoring and payment	0.5	Understanding of the correct and incorrect approaches to take to the problem
1.2	Looking at examples of systems	0.5	Improve understanding of how development systems work and how they're implemented
1.3	Looking at platforms that offer similar services and how they implement solutions	0.5	Understand the issues that similar platforms had when implementing their own solutions
2	**Analysis and design**		
2.1	Investigate different approaches to Recommendation systems	2	Decide which type of recommendation system to create and the language/tools to build it
2.2	Investigate different technologies to create the application platform	1.5	Decide what to use to create the full stack application in terms of DB technology, server toolchain and front-end framework
2.3	Create a data model which represents the different data structures and their relationships	0.5	A model for all the necessary data structures that will be created and the relationships they'll have
2.4	Plan user journey through application	1	A general idea of navigational structure in the website
3	**Develop prototype**		
3.1	Code editor implementation	5	A working code editor that can be used
3.2	Implement the server socketsand API endpoints	5	An API that can be used from any client in order to access information from the database
3.3	Initial development of the front end of the app	5	A working front end with all the required functionality for the platform
4	**Testing, evaluation/validation**		

4.1	Unit testing	0.5	Confidence that the system is functioning correctly
4.2	Recommendation algorithm testing	0.5	Confidence that the recommendation system works as intended
5	**Assessments**		
5.1	write-up project report	2	Project Report
5.2	produce poster	0.5	Poster
TOTAL	**Sum of total effort in weeks**	**24**	

RISK ASSESSMENT FORM

Assessment Reference No.		**Area or activity assessed:**	
Assessment date			
Persons who may be affected by the activity (i.e. are at risk)	**Joseph Fazzino**		

SECTION 1: Identify Hazards - *Consider the activity or work area and identify if any of the hazards listed below are significant (tick the boxes that apply).*

1.	Fall of person (from work at height)		**6.**	Lighting levels		**11.**	Use of portable tools / equipment		**16.**	Vehicles / driving at work		**21.**	Ha ch
2.	Fall of objects		**7.**	Heating & ventilation		**12.**	Fixed machinery or lifting equipment		**17.**	Outdoor work / extreme weather		**22.**	Ha bio
3.	Slips, Trips & Housekeeping		**8.**	Layout , storage, space, obstructions		**13.**	Pressure vessels		**18.**	Fieldtrips / field work		**23.**	Co asp
4.	Manual handling operations		**9.**	Welfare facilities		**14.**	Noise or Vibration		**19.**	Radiation sources		**24.**	Co Bu
5.	Display screen equipment		**10.**	Electrical Equipment		**15.**	Fire hazards & flammable material		**20.**	Work with lasers		**25.**	Fo

SECTION 2: Risk Controls - *For each hazard identified in Section 1, complete Section 2.*

Hazard No.	Hazard Description	Existing controls to reduce risk	**Risk Level** (tick one)			Furthe
			High	Med	Low	*(provid*
26	Occupational stress	Get fresh air, exercise, regular breaks.			✓	None
Name of Assessor(s)			**SIGNED**			
Review date						