

School of Computing
Year 4 Project Proposal Form

SECTION A

Project Title Docker Einstein

Student Name Ben Coleman

Student ID 15487202 Stream CASE4

Project Supervisor Name Stephen Blott

[Note: It is the student's responsibility to ensure that the Supervisor accepts your project and this is only recognised once the Supervisor assigns herself/himself via the project dashboard. Project proposals without an assigned Supervisor will not be accepted for presentation to the Approval Panel.]

SECTION B

Project Description

Area Covered:

Cloud computing, Educational services.

Outline:

Background

The idea of an Einstein system built with Docker was suggested by a lecturer, but was of interest to me due to my INTRA placement. I was introduced to Docker development and deployment, and working within a system of namespaces, clusters, containers and images. Doing so gave me the ability to understand the merit in rebuilding an application such as Einstein with dockers in mind, for more efficient usage and scalability.

Achievements

The Einstein application itself is used for automated correction of student programming scripts. It runs sample test input against a student's work and expects the corresponding output. However, it was built over time and was not put together as a complete package application with wider usage or heavy load requirements in mind. Using Dockers, instance containers can be created and used for a student and torn down when finished. This process is light and efficient, and completely independent of other containers being used. As a result, a new Docker-based Einstein system could handle higher traffic from many more students simultaneously, allowing it to perform better and be available to other courses or universities.

The users of the new system would be any students interacting with the current Einstein system in their studies, or any lecturers/staff that use it for administrative/correction purposes. However this user base could grow to more students either internally or from other universities due to the benefits that docker development would bring.

Justification

The reconstruction of this Einstein application will be useful as it is clearly a tool that has a future within DCU and potentially other universities. The usage of this system as a correction automation utility for programming scripts is already pivotal to the course and is relied upon yearlong by students and lecturers across multiple modules. Improving the architecture and design, while increasing stability at runtime with hundreds or thousands of students interactions would push the potential further and ensure that it is still a pivotal tool within the future.

Programming Languages:

- Java
- JavaScript
- HTML/CSS

Programming Tools:

Web server, Database, Docker, Kubernetes.

Learning Challenges:

Docker Development - I have an understanding of docker containers, and container orchestration systems such as Kubernetes. However, developing within a docker style environment and establishing a new project from the ground up are not the same and will require investigation to ensure it is executed appropriately.

The LDAP (Lightweight Directory Access Protocol) currently used with the Einstein system on the DCU servers.

Software Platform:

Linux - Elementary OS

Special Requirements:

N/A