SCHOLARSHIP OF TECHNOLOGY ENHANCED LEARNING

Containerization: Practical infrastructure and accessibility efficiency for the Virtual Learning Environment

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Abstract:

A container image is a lightweight package of software that includes everything needed to run an application, within a self-contained structure. Container images are transforming modern application infrastructure, providing advantages for accessibility and allow many instances of existing legacy applications to be run at the same time on the latest operating systems. This can implement an ideal virtual learning environment which offers a dynamic learning space where instructors upload activities and resources to enhance learning. The goal is to provide a structured learning environment suited to both the student and the instructor, where materials are easily accessed, and that many files can be transferred at one time. The system should cope with the demands of many students occupying the same virtual learning space, providing each student with individual learning experiences. There are challenges when instructors attempt to adapt the learning environment to meet the learning objectives. Technology barriers to the education provider, primarily in the form of high cost of technology infrastructure requirements need to be overcome before widespread adoption of a virtual learning environment is seen. The potential to overcome these barriers through the application of containerisation provides the motivation behind this presentation (Katz & Council of Independent, 2016; Puvaneswary & Siew Hwa, 2019).

A practical example of the use of container images is to supply many instances of the same application running on a single machine. Each instance is isolated, along with any associated dependencies, allowing efficient utilisation of system resources, such as processing and memory. The presentation will show that many instances of the same application can be activated and show the resource advantages gained. The presentation will demonstrate a system that has been used to provide a complex structured virtual learning environment to level 7 students and discuss how the system has been utilised to provide a positive, individualised learning experience to the students. Security and confidentiality aspects are maintained within each containerized instance. The presentation will show how the system can be configured to be self-healing, respond to scheduling, and to automatically restart single instances as required.

The presentation will show how the advantages of containerization can be integrated at many levels of the virtual learning environment, providing many separate and individual instances of the same application. The number of instances can be easily adjusted as required, and resources are automatically allocated, reducing support overhead and cost of infrastructure. The implications are that each instance can provide a unique experience to each student, whilst reducing the workload of the instructor, and minimizing the cost to the education provider.

References

Katz, P. M., & Council of Independent, C. (2016). *High-Tech or High-Touch? Online Learning and Independent Higher Education. Innovations in Teaching and Learning. Research Brief 5*: Council of Independent Colleges. Retrieved from http://ezproxy.aut.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED569215&site=eds-live

Puvaneswary, M., & Siew Hwa, Y. (2019). Navigating the Shortcomings of Virtual Learning Environments Via Social Media. *International Journal of Virtual and Personal Learning Environments (IJVPLE), 9*(2), 1-14. https://doi.org/10.4018/IJVPLE.2019070101