**Docker based Solutions for Modules**

A subheading, if needed



[ICT Project CA00CI06-3001](https://learn.hamk.fi/course/view.php?id=10655)

Computer Application, Hämeenlinna University Centre

Spring 2022

**Adekunle John, Mathews Asare, Siddharth Chauhan, Enitan Mautin**



Computer Application Abstract

Hämeenlinna University Centre

Authors **Adekunle John, Mathews Asare, Siddharth Chauhan, Enitan Mautin**  Year 2022

Subject Docker based Solutions for Modules

Supervisors Deepak Kc.

ABSTRACTS

Productivity, security, and other multiple benefits of BYOD cannot be over emphasized, the flexibility keep both students and teachers on top of studies and work. students can access the same software and apps because they own the electronic devices used in the classroom. After all, learning doesn’t have to stop just because the school day has ended. (Christensen, 2019)

This project utilizes CodeRunner to test SQL queries, Docker implementation and sharing of Docker Database in real time with version control such as GitHub or other workable solutions for testing and development purposes as well as Docker implementation for Software Development Module AND within WSL2.

HAMK Moodle environment with Lectures privileges steers up previous knowledge on Introduction to Software Development skills such as SQL queries which allows to set questions on CodeRunner. Documentations, eBooks, and Meetings with stakeholders (clients, supervisor) were utilized for the success of the project.

Multiple questions on SQL queries which test student knowledge, a detailed documentation

on installation of Dockers on windows, sharing of Docker database in real time through

version control and implementation of Software development and WSL2 were all successful

in this project.

Keywords Chocolatey, SQL, Docker, CodeRunner, Moodle

Pages XX pages and XX appendices

Contents

[1 Introduction 1](#_Toc97672701)

[2 Theoretical framework 2](#_Toc97672702)

[2.1. The contents of the theory chapter(s) 2](#_Toc97672703)

[3 Description of the practical project 4](#_Toc97672704)

[3.1 Research on a topic? 5](#_Toc97672705)

[3.2 What challenges did you face (and overcome)? 5](#_Toc97672706)

[3.3 Figures and tables 6](#_Toc97672707)

[4 Conclusion 7](#_Toc97672708)

[5 Project team responsibilities 7](#_Toc97672709)

[6 Evaluate your role as a Steering group 8](#_Toc97672710)

# Introduction

School’s budget for technology requires savvy planning and ability to consider creative solutions, implementing tools and technologies to enhance BYOD teaching can be of immense help. The focus of this project is to automate testing of SQL queries and dockerizing the Software Development Module and Databases course as well as possibility of sharing Databases in real time with every version control available.

Computer Application and Business Information Technology of HAMK Institute will take advantages of faster configuration and deployment of databases, seamless portability, continuous testing, and deployment that is available through Docker base solutions.

Introduction to Software Development skills such as SQL queries, CodeRunner, WordPress Design, Java (object-orientated programming and project), Docker, Version Control (GitHub) etc. will serve as basis for this project, batch script for installation of applications needed.

The following will be the focus of this project

* Utilizing code runner to test SQL queries.
* Simplified Docker Installation process in Windows.
* Docker implementation for the Databases sharing in real time through version control (GitHub)
* Docker implementation for Software Development Module.

# Theoretical framework

CodeRunner is a free open-source question-type plug-in for Moodle that can run program code submitted by students in answer to a wide range of programming questions in many different languages. It is intended primarily for use in computer programming courses although it can be used to grade any question for which the answer is text. (Lobb, 2021). In this project the questions will be SQL queries for single and multiple questions.

Docker is an open source that facilitates the deployment of applications in software containers. It is a set of PaaS products that deliver containers (software packages) using OS-level virtualization. It embodies resource isolation features of the Linux kernel but offers a friendly API. (KodeKloud, 2020).

2.1. The contents of the theory

HAMK Moodle lecturers privileged was set up for team members to set up the CodeRunner as well as preview the questions as student. The privileges include what support files is needed, questions bank etc., DB Browser for SQLite to generate Database which turns out of more effect than any other SQL workbench (refer to [SQLite\_Doc](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EYFOMU3WrDlOs4NZtjfC5PEBtjW5or4nWebi4qeoUHREZw?e=mq55eF)). The student’s knowledge on SQL is tested through multiple questions which also shows the expected results to guide the students is generated through different tables (databases) and the result of the quiz is known after submitting the answers.

Installation of Docker through bath script requires enabling virtualization and this can be checked through System Info or using PowerShell for administrative right. Some windows systems allow just bio settings, (refer to [Docker\_Installation\_process](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EXcc__fnyJdBohDKBQ-_HLEBiNy70j_nI-BWFIaePCpOZQ?e=9IWJDP) ). A .bat script on Command prompt will install both chocolate package and docker on the host machine.

Docker images sets up PhpMyAdmin for backend, WordPress to design a site for the project, code editor, version control access (GitHub). Changes are made on project site and database is shared through GitHub in real time. The changes are pushed to GitHub by one of the team members and the other team pulls it down on its own code editor to reflect the changes on the site (refer to [Docker\_databases\_sharing\_real\_time\_versionControl).](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EaHQ_Jj9qpRIoIxPi1BVtIEBE-FCKSxPrfRbZGN13tFYyw?e=pYrMYx)

In addition to the usage of docker, Software development project is also implemented through docker with java Open JDK version 15 or later which if not available, will be handled by Docker image. (refer to [Build Image in Docker.docx](https://hameenamk-my.sharepoint.com/:w:/g/personal/adekunle19100_student_hamk_fi/EYECL6n-VAlOo4kZti3Uj5MBXgta9AoXPvNhnosE8UFt1w?e=dto4bH))

# Description of the practical project

BYOD or Bring Your Own Device is a practice that encourages students to learn at their own pace, taking quizzes or test as at when ready, it is also saving the school’s budget for technologies which requires planning and ability to consider creative solutions. Implementing tools and technologies such as Docker saves the school from having different computers with different operating systems, such as Windows, Linux, and the rest of such.

* + - * Multiple questions on SQL quiz in Moodle environment where both the students can take the quiz and get the result immediately and teacher can save time on collating the results. (refer to [SQLite\_Doc](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EYFOMU3WrDlOs4NZtjfC5PEBtjW5or4nWebi4qeoUHREZw?e=mq55eF) )
      * Installation of Docker. This enables students to separate their application from their infrastructure, so software of project can be delivered in quick time and in our case the WordPress designed for this project (refer to [Docker\_Installation\_process](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EXcc__fnyJdBohDKBQ-_HLEBiNy70j_nI-BWFIaePCpOZQ?e=9IWJDP))
    - Sharing of Docker Databases in real time through version control. Codes generated on PhpMyAdmin from WordPress pages are shared amongst team at real time. (Refer to [Docker databases\_sharing\_real\_time\_ version Control).](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EaHQ_Jj9qpRIoIxPi1BVtIEBE-FCKSxPrfRbZGN13tFYyw?e=pYrMYx)
* Implementation of Software development and WSL2. this entailed containerizing an existing software development app from a host environment due to the constraints of time for this project. (Refer to [Build Image in Docker.docx](https://hameenamk-my.sharepoint.com/:w:/g/personal/adekunle19100_student_hamk_fi/EYECL6n-VAlOo4kZti3Uj5MBXgta9AoXPvNhnosE8UFt1w?e=dto4bH))

## Research on a topic?

* + - * + Different tests were done on SQL Workbench, DB Browser for SQLite, both have their advantages and disadvantages but as at this time of project the latter gives better results.
        + Several posts on Docker Community platform for suggestions as to the issues at hand in addition to questions and answer time with the inventor of CodeRunner Richard Lobb.
* Thorough Research on supported files for CodeRunner, requirements for Docker installation on different windows (Home, Pro, S Mode) as regards Virtualization enabling.

## What challenges did you face (and overcome)?

* + - * + CRUD The acronym refers to the major operations which are implemented by databases, each letter in the acronym can be mapped to a standard Structured Query Language (SQL) statement (Foundation, 2022), but this project can only fetch (Read) from the database, the other queries were not achieved.

Table

Table

Description automatically generated

* Running batch script for enabling virtualization poses some issues due to different windows operating systems.
* The greatest challenge that everyone does is control over time, the project has deadlines and so drawing the cotton currently is necessary.

## Figures and tables

Figure 1. Db directory, parent to WordPress folder needed for update.

Text

Description automatically generated

Figure 2. WordPress Site for Project

*Text

Description automatically generated*

Figure 3. Screenshot of containerized app and deployed on docker hub  
*Graphical user interface, text, application, website

Description automatically generated*

# Conclusion

Single SQL quiz to prepare the students on effective use of the environment before taking the final multiple quiz which will be graded. Docker Implementation on windows, sharing database on GitHub in real time, containerizing an app on Docker for the effectiveness of BYOD.

Utilizing CodeRunner to test SQL queries bout some limitations on the project at present, the queries such as create, update, and delete were not achieved in this release version. The docker implementation was only achieved on Windows systems because of time constraints.

# Project team responsibilities

All hands have been on deck for the success of this project, below are the team members and the part handled, respectively.

**Adekunle John** was responsible for containerizing app and deployment on docker, all necessary documentation and handling all issues on such from other team members.

**Mathews Asare** handled all documentations required in writing of bash script for docker installation on windows operating systems.

**Siddharth Chauhan** did not hold back his experiences with SQL queries to make sure the multiple questions were done on CodeRunner.

**Enitan Mautin** also handled the implementation and documentations necessary for sharing Databases in real time.

# Evaluate your role as a Steering group

ICT-project, that our team evaluated:

Names of the members in that team:

Mohamed Al.-Ajily  
Lidija Simoliunaite  
Aleksandr Sohhatov  
Eszter Peterfay

References

https://docs.moodle.org/311/en/CodeRunner\_question\_type (Lobb, 2021)

<https://dev.to/kodekloud/the-role-of-docker-in-devops-1con> (KodeKloud, 2020)

<https://www.classcraft.com/blog/pro-and-con-byod-school/> (Christensen, 2019)

<https://en.wikipedia.org/wiki/Create,_read,_update_and_delete> (Foundation, 2022)

<https://docs.docker.com/get-started/overview/> (Inc, 2021)

Appendix 1: Name of the appendix

* [SQLite\_Doc](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EYFOMU3WrDlOs4NZtjfC5PEBtjW5or4nWebi4qeoUHREZw?e=mq55eF)
* [Creating a quiz in Coderunner](https://1drv.ms/w/s!Am-uDqmSnzZtha918z0BGO3aSa9jvg?e=uRXGKf)
* [Creating a Question in Coderunner](https://1drv.ms/w/s!Am-uDqmSnzZthbAMINMt8fykEiFxHQ?e=kR2E6d)
* [Docker\_Installation\_process](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EXcc__fnyJdBohDKBQ-_HLEBiNy70j_nI-BWFIaePCpOZQ?e=9IWJDP)
* [Docker\_databases\_sharing\_real\_time\_versionControl](https://hameenamk.sharepoint.com/:w:/s/ICT_Project_2021/EaHQ_Jj9qpRIoIxPi1BVtIEBE-FCKSxPrfRbZGN13tFYyw?e=pYrMYx)
* [Build Image in Docker.docx](https://hameenamk-my.sharepoint.com/:w:/g/personal/adekunle19100_student_hamk_fi/EYECL6n-VAlOo4kZti3Uj5MBXgta9AoXPvNhnosE8UFt1w?e=dto4bH)