

INTERNSHIP: PROJECT REPORT

Internship Project Title	RIO:125: Set up docker container for application development using BlockChain Network
Project Title	Set up Docker container for application development using BlockChain network
Name of the Company	Tata Consultancy Services
Name of the Industry Mentor	Dr. Debashish Roy
Name of the Institute	Sister Nivedita University

Start Date	End Date	Total Effort (hrs.)	Project Environment	Tools used
22/11/2021	16/1/2022	131	UBUNTU(18.04)	Git,GitHub, Docker, Ethereum, JDK, Eclipse, Solc, NodeJs, Truffle, Ganache, Solidity, VIM, Git, etc

Project Synopsis:

Docker is a containerization platform that packages your application and all its dependencies together in the form of a docker container to ensure that your application works seamlessly in any environment.

Docker container image is a lightweight, standalone, executable package of software that has everything you need to run an application — code, runtime, system tools, system libraries, and settings. The isolation and security allow you to run many containers simultaneously on a given host without interference.

Containers are lightweight because they don't need extra load of a hypervisor, but run directly within the host machine's kernel. This means you can run more containers on a given hardware combination than if you were using virtual machines. You can also run Docker containers within host machines that are actually virtual machines.

Docker Containers Key points

1. VM is virtualization of Hardware, while Container is virtualization of OS.
2. Containers are all about ability to make quick, iterative deployments of our applications.
3. Using containers changes how we develop, test and deploy applications.
4. Docker helps us to test the code before we deploy it to production as soon as possible.
5. Since Docker containers are lightweight, they are very easily scalable.
6. Docker containers run everywhere: Linux, Windows, Cloud, Serverless, Data Centers etc. We can run the same containers everywhere.
7. Docker has the ability to reduce the size of development by providing a smaller footprint of the operating system via containers.

Solution Approach:

(Advisory Followed in the Presentation given on the RIO Platform)

- Creating a docker file with the following specifications:
 - A. Installing git (for version control)
 - B. Installing vim (required for editing the files)
 - C. Installing build-essential
 - D. Installing openJDK (Java Development Kit)
 - E. Configuring OpenJDK
 - F. Setting the environment variables if not already configured in the GUI setup
 - G. Installing Eclipse IDE and configuring the same in GUI setup
 - H. Install the YAKINDU plugin for Eclipse to support solidity
 - I. Set the YAKINDU plugin
 - J. Installing EVM and configuring the same
 - K. Installing Solc and configuring the same
- Creating a docker file and creating an image
- Once Image is created and up and running testing the image
- Once Image is up and running update the Docker file and add the following
 - A. Install and configure NodeJS
 - B. Install and configure truffle packages
 - C. Install and configure testrpc
 - D. Initialize truffle projects
 - E. Deploying the contracts
 - F. Creating DAPP
 - G. Launch the DAPP server
 - H. Install and configure Ganache
 - I. Exposing the port
 - J. Configure the environment variables if needed
- Create the docker image after updating the Docker files
- Create a blockchain network with Ganache using the image created after updating the Docker file
- Test the workspace and interface
- Perform transactions

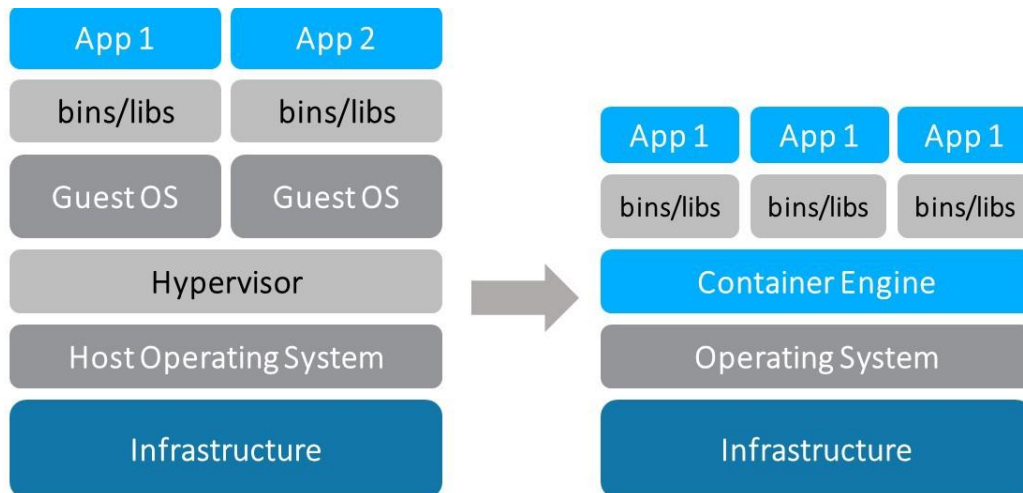
Assumptions:

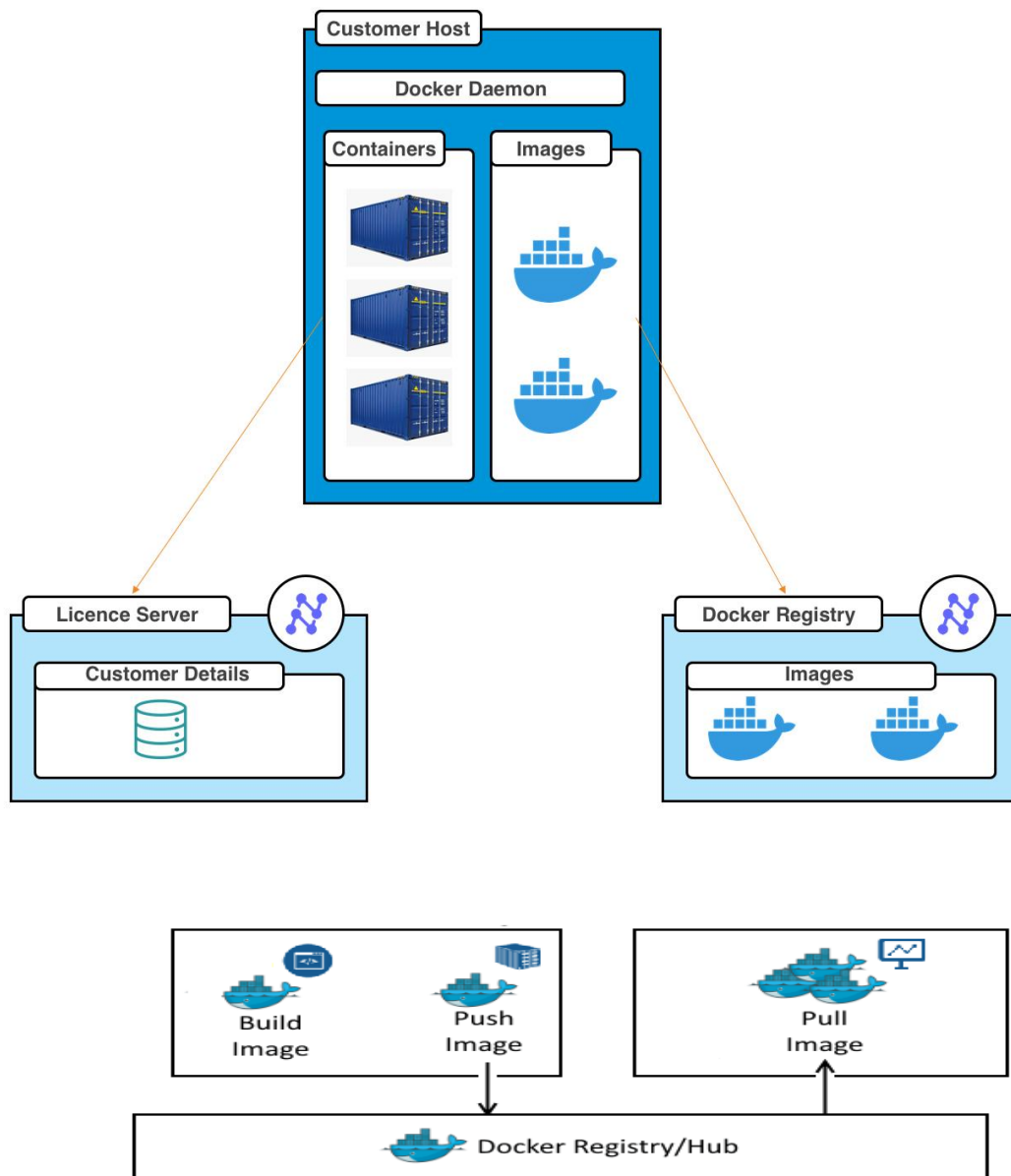
- The OS used is Linux (Ubuntu).
- Git is pre-installed and a root folder is created.
- Dependencies are updated.

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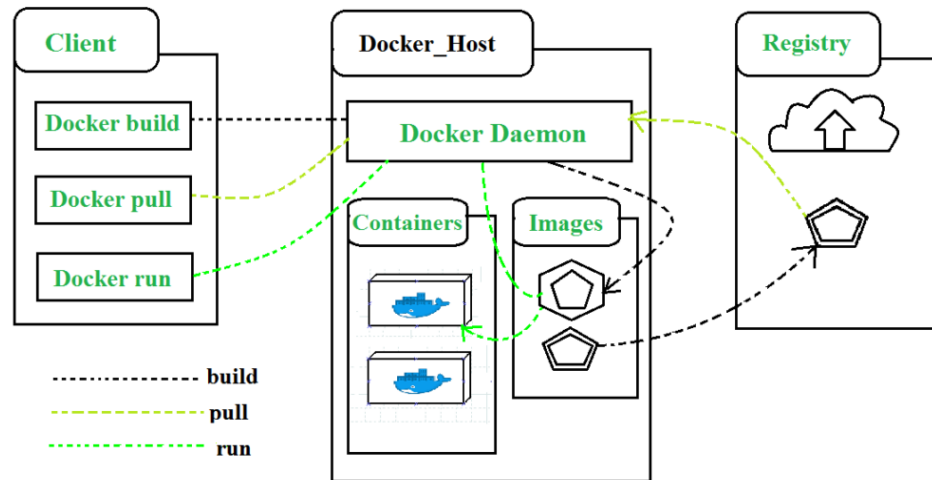
- Docker is updated.
- The IDE used is Eclipse and the text editor used is VIM.
- Docker's official GPG key is used for security purposes.
- Captured Runtime execution for some to observe the Process scheduling.

Project Diagrams:





Algorithms:



- Setting Base ubuntu as ubuntu 18.04
- Running an update and installing git, vim, curl, OpenJDK
- Install JRE
- Installing the Eclipse IDE
- Set environment variable:

ENV JAVA_HOME=/usr/lib/jvm/java-11-openjdk-amd64/jre/bin/java

- Installing Ethereum
- Installing NodeJS and NPM
- Installing ganache, express and solc
- Updating the system again after the installations are done
- Making a directory and installing truffle@4.1.15
- Exposing the port: 8080 in my case
- While setting the truffleconfig set host to 127.0.0.1(Default), port to 9575 and network id to *
- Set contracts and migration
- Creating a simple bank application using Java script and testing it.

Outcome:

- Dynamic Docker Image is up and running.
- Docker compose file is ready.
- Image was tested and ready.
- Blockchain network created with Ganache CLI.
- The application development container is ready.
- The platform is tested using smart contracts.

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Exceptions considered:

- The image will detect any protection software and can make some glitch during Execution.
- The OS must Be Up to Date.
- Environment must be Clean and Configured
- Environment variable and PATH Variable must be set up

Enhancement Scope:

- The docker file can tuned in such a way that the execution time can be less
- The Reusability can be made better
- The Security can be made more versatile to enfasure protection
- The opensource Communities can be more focus to solve this problems
- Else everything is fine till my knowledge.

Link to Code and executable file:https://github.com/naveenshaw/Docker_TCS_Rio