Development Operations
Assignment # 4

MEMBER1 REG#: _____ NAME: _____

MEMBER2 REG#: _____ NAME: _____

COURSE CODE: CS423 INSTRUCTOR: MUHAMMAD SAJID ALI

TOTAL MARKS: 120

Configuration Management

Instructions

As part of system management and engineering, configuration management ensures the software's consistent performance, connecting functionality, design, and product requirements. For this, a specialist must get to the bottom of the system at hand and be able to monitor its performance state throughout with the goal of achieving a particular operating state. All the processes involved with the configuration management of any system usually result in reconfiguring, updating, or patching the whole thing where needed.

Configuration management helps to avoid the inconsistencies between versions of the software while testing whereby guaranteeing the configuration continuity. It also helps keep everything documented and reported, so no minor system changes and misconfigurations that may undermine the performance and spawn further issues go unnoticed. This ultimately helps avoid excessive downtime and overall system instability.

In the process of configuration management, specialized tools and approaches are used to avoid handling manual tasks in extensive software environments where the manual input is impossible (these may include actions prioritization, completion validation, and such stuff). Tools help to store the achieved system state to easily maintain it over time while allowing to eliminate human errors through automation, speed up system deployments and configurations, better scale, and predict many systems customization and configuration outcomes.

You as a DevOps engineer are asked to configure the Virtual Machines (VM) using ***Ansible*** and make it ready for the development and deployment processes.

Task 1: Create a docker compose file that will generate *five* docker containers based on ubuntu image. The first container will act as a control node and the others as a managed node. All containers should be linked to a network named cs423-assignment-4. Later, two of the managed nodes will host the database server and others will host the website on nginx server. **(40 marks)**

Task 2: Create a directory named *assignment-4* in your control node and build your customized inventory. This directory will act as project directory and Ansible must pick all needed configurations from here. The inventory will include managed nodes required details. You must group managed nodes under appropriate groups where needed. Ansible must build connection with containers using ssh keys and all containers should use same keys and username. **(20 marks)**

Task 3: Create the playbook that will include the following plays and tasks to execute on the group of servers you have created in your customized inventory. You must give appropriate names (presents the working of a play) to all plays. **(60 marks)**

1. Play1
    A. This must run on all hosts (managed nodes) in your inventory
    B. It will include the following three tasks
        I. The first task must be pinging all the hosts.
        II. Second will output a summary of RAM usage, including total, used, free, shared, and available memory and swap space
        III. Third will install git on all hosts using *apt* module and make sure it is present
2. Play2
    A. This must run on hosts that will host the ICET-2022 Website.
    B. It will include the following tasks,
        I. Install nginx server using *apt* module and make sure it is present.
        II. Make sure the service is running
        III. Clone the ICET-2022 website

            GitHub URL: https://github.com/msajidaligik/gik-fcse-icet2022.git

        IV. Copy the files to a root directory of nginx

    Make sure website is running on port 80 after you visit http://localhost:80
3. Play3
    A. This must run on hosts that will host the database.
    B. It will include the following two tasks,
        I. Install postgres SQL database and make sure it is present.
        II. Make sure the database service is running
        III. Install pgAdmin client for postgres SQL database
        IV. Connect database with your installed client

    Make sure the client is running on when you visit URL in your browser.

What to Hand In

1. All changes should be committed to your *cs423-assignment-4* repository
2. Submit the zip file of your infrastructure as code files
    A. Docker compose file
    B. Project directory
        I. Includes inventory and configurations
        II. Playbooks
3. Submit the word document that includes
    A. All infrastructure as code files
    B. Screenshots of ansible output for each play in play book
    C. Screenshots of running database client