Cloud Computing

Final Project

CS6343.001 – Cloud Computing

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# Introduction

Randeep: Mainly for completeness, elaborate the project objectives and high level tasks

# Team Info

Team Lead: Christopher Michael Scott

Team Meetings: T/Th 4:00pm – 6:00pm CST

Meetings with Professor: F 4:00pm – 4:30pm CST

# Approach

## Workflow

Workflow 1: Grocery store Point of Sale + recognition

* Component 1: Self-checkout scale activation (simulated)
  + When an item it detected on the scale, activate the rest of the workflow
  + non-bulk items would skip the obj recognition
* Component 2: Object recognition - recognize item(s) on the scale
  + Feature set: type (celery, watermelon, potatoes, onions, etc.)
  + Other features: timestamp
* Component 3: Database
  + Database entry for item, including the image, recognition result, timestamp
  + Cassandra
* Component 4: Analysis
  + Identify the correlation between the purchased items, time of day, and day of week
  + Time-series analysis to predict demand at specific days in the year
* Component 5: Restocking
  + Check if items go out of stock, and do simulated supply orders
  + Scan the database periodically
  + (optional) take a rolling average of velocity of items and order more as demand changes

Workflow 2: Delivery Pizza with Online Orders

* Component 1: Order collection and rule checking
  + Collect online orders (as json objects)
  + Verify that the orders are legit and paid for
* Component 2: Database (See WkF Component 3)
* Component 3: Analysis component
  + Estimate delivery time
  + Track drivers to determine their speed/efficiency
* Component 4: Restock (See WkF Component 5)

## Docker Swarm Install

Installation of the Docker Engine was straight forward and followed the procedure as written in [Installation Docker Engine on CentOS](https://docs.docker.com/engine/install/centos/). The creation of a swarm was successful, albeit, after a minor issue was encountered and overcome; details are provided in the “Problems Encountered” section.

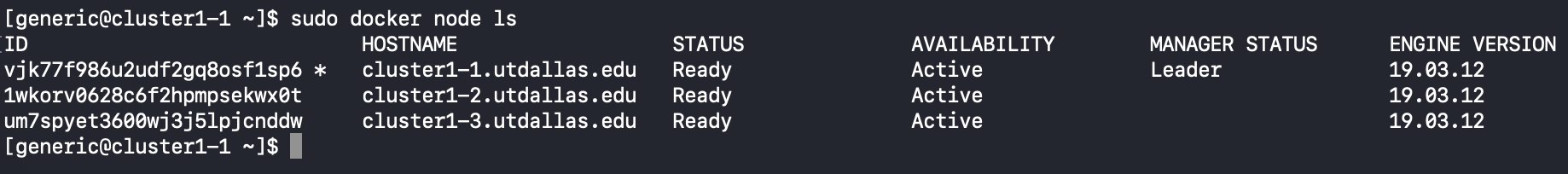


Figure : Swarm Node List

The swarm configuration is as follows: computer cluster1-1 is the manager node, computer cluster1-2 is a worker node, and computer cluster1-3 is a node worker. Figure 1 is the manager node output of the “sudo docker node ls” command, which lists all the nodes that the swarm manager knows about and demonstrates that the swarm has been configured correctly.

## Docker Images

WF2, C1:

* GitHub Link: <https://github.com/CPVazquez/CS6343/tree/master/Workflows/WF2/Components/C1>
* Image Size: 92.5MB
* Code Size: 40KB
* Code Description:

Pulled python:alpine3.11 certified image as base. Created a webserver using python flask with a single endpoint, order, through which orders to the pizza shop are received. Conducted tests using python unittest. Specified accepted json format using python jsonschema.

## Problems Encountered

Docker Swarm:

* The initial attempt to add worker nodes to the manager node’s swarm was unsuccessful. This resulted in each computer in the cluster being in separate swarm. The error message generated from the “docker swarm join …” command indicated there may a potential port issue.
* Prior to troubleshooting, it was determined that the documentation should be revisited to ensure that a step was not missed.
* [Post-installation Steps for Linux](https://docs.docker.com/engine/install/linux-postinstall/) contained the missing piece of information:
  + The Docker daemon binds to a Unix socket, which by default is owned by the root user.
  + The swarm configuration was done using the generic user account, not root.
  + For non-root users, “docker” commands should be preceded by “sudo” to allow access to the Unix socket.
* The second attempt to setup the swarm with “sudo docker …” commands was successful.

# Comments

N/A

# Experiments and Results

N/A

# Operation Manual

N/A

# Workload Distribution

## Carla

* Arranged team meeting times
* Created Project Report Outline
* Created GitHub repository for the project
* Installed Git on the cluster
* Containerized workflow 2, component 1

## Chris

* Changed password for the cluster’s generic user
* Created personal user account with NetID as username
* Installed Docker Engine on the three-machine cluster
* Configured Docker Engine Swarm Mode on the cluster
* Web server testing

## Daniel

* Thing

## Randeep

* Thing