Multiple Choice Questions

Python

1. Which of the following is used to output text in Python?

   a) `echo`

   b) `print`

   c) `console.log`

   d) `printf`

2. What is the result of the following Python code?

   ```
   numbers = [1, 2, 3, 4, 5]
   result = [n*2 for n in numbers if n/2 in [1,2,3,4,5]]
   print(result)
   ```

   a) `[2, 4, 6, 8, 10]`

   b) `[2, 4, 6, 8]`

   c) `[4, 8]`

   d) `[2, 4]`

3. Consider the following Flask application:

   ```
   from flask import Flask, request, jsonify
   app = Flask(__name__)

   @app.route('/sum', methods=['POST'])
   def sum_numbers():
       data = request.get_json()
       numbers = data.get('numbers', [])
       result = sum(numbers)
       return jsonify({'sum': result})

   if __name__ == '__main__':
       app.run()
   ```

   If a POST request is made to `/sum` with the following JSON payload:

   `{"numbers": [1, 2, 3, 4, 5]}`

   What will be the JSON response?

   a) `{"result": [1,2,3,4,5]}`

   b) `{"sum": 15}`

   c) `{"numbers": 15}`

   d) `{"sum": "sum[1,2,3,4,5]"}`

Bash

4. Which command is used to display the current working directory?
   a) `pwd`
   b) `cwd`
   c) `dir`
   d) `ls`

5. What does the following Bash script do?
   ```
   for file in *.txt
   do
     echo "Processing $file"
   done
   ```
   a) Deletes all `.txt` files
   b) Processes each `.txt` file and prints the filename
   c) Renames all `.txt` files
   d) Counts all `.txt` files

6. Given the following Bash script, what will be the output if the script is executed?

   ```
   #!/bin/bash

   sum=0
   for i in {1..5}
   do
       sum=$((sum + i))
   done

   echo "Sum is $sum"

   if [ $sum -gt 10 ]; then
       echo "Sum is greater than 10"
   else
       echo "Sum is 10 or less"
   fi
   ```
   a) `Sum is 15; Sum is greater than 10`
   b) `Sum is 10; Sum is 10 or less`
   c) `Sum is 15; Sum is 10 or less`
   d) `Sum is 5; Sum is greater than 10`

Git

7. Which command initializes a new Git repository?
   a) `git init`
   b) `git start`
   c) `git create`
   d) `git new`

8. What is the difference between `git pull` and `git rebase`?

   a) `git pull` fetches and merges changes from a remote repository, while `git rebase` changes the base of your commits.
   b) `git pull` only fetches changes from a remote repository, while `git rebase` merges changes.
   c) `git pull` is used to update your local branch with changes from a remote branch, while `git rebase` is used to combine multiple commits into one.
   d) `git pull` updates your local branch by fetching and integrating remote changes, while `git rebase` applies your local commits on top of another branch's history.

8. How do you merge a branch named `feature` into the `main` branch?
   a) `git branch merge feature`
   b) `git checkout feature && git merge main`
   c) `git checkout main && git merge feature`
   d) `git merge main feature`

Docker

10. How do you start a **NEW** Docker container?
    a) `docker run`
    b) `docker start`
    c) `docker up`
    d) `docker go`

11. What is the purpose of the `EXPOSE` instruction in a Dockerfile?
    a) To expose ports to host machine
    b) To expose network ports in the container
    c) To expose network ports in the image
    d) To expose environment variables in the image

12. Given the following Dockerfile:

```
FROM python:3.8-slim-buster

WORKDIR /app

COPY requirements.txt requirements.txt

RUN pip install -r requirements.txt

COPY . .

CMD ["python app.py"]
```

What will be the result if you build and run this Dockerfile assuming `requirements.txt` lists the necessary dependencies and `app.py` exists and is correctly configured?
a) The Docker container will start and run `app.py`.
b) The Docker container will fail to build because `requirements.txt` is missing.
c) The Docker container will fail to start because `CMD` is incorrectly specified.
d) The Docker container will build but fail to run because the working directory is not specified.

Docker-Compose

13. How do you scale a service named `web` to 3 instances using Docker Compose?
a) `docker-compose scale web=3`
b) `docker-compose up --scale web=3`
c) `docker-compose scale --web=3`
d) `docker-compose up -d web=3`

14. What role does the `build` directive serve within a service definition in a Docker Compose configuration (docker-compose.yml) file?
a) It specifies the base image for the Docker container.
b) It configures the runtime environment variables for the service.
c) It orchestrates the deployment of multiple containers across a distributed cluster.
d) It instructs Docker Compose to build a Docker image using the Dockerfile located at the specified path.

15. Consider the following `docker-compose.yml` file:

```
version: '3.8'

services:
  web:
    image: nginx
    ports:
      - "8080:80"
    environment:
      - NGINX_HOST=example.com
      - NGINX_PORT=80
  app:
    build:
      context: .
      dockerfile: Dockerfile
    volumes:
      - .:/code
    ports:
      - "5000:5000"
    depends_on:
      - db
  db:
    image: postgres
    environment:
      POSTGRES_PASSWORD: example
    volumes:
      - db_data:/var/lib/postgresql/data

volumes:
  db_data:
```

Which of the following statements is true?
a) The `web` service will automatically restart if it fails.
b) The `app` service will wait for the `db` service to be ready before starting.
c) The `db` service exposes its data directory to the host file system.
d) The `volumes` key under the `app` service defines a named volume.

Prometheus

16. What is a time series in Prometheus?
a) A type of graph
b) A sequence of data points indexed in time order
c) A configuration file
d) An alert rule

17. What does Prometheus use to collect metrics from a target?
a) Agents
b) Exporters
c) Probes
d) Collectors

18. What does the following PromQL query mean?
`rate(http_requests_total{job="webserver"}[5m])`
A) It calculates the average rate of HTTP requests received by the "webserver" job over the last 5 minutes.
B) It calculates the total number of HTTP requests received by the "webserver" job in the last 5 minutes.
C) It computes the percentage change in HTTP request rate for the "webserver" job over the last 5 minutes.

D) It retrieves the instantaneous rate of HTTP requests received by the "webserver" job at the current moment.

Grafana

19. Which of the following best describes a panel in Grafana?
    a) A user interface component for building dashboards
    b) A script for collecting metrics
    c) A data storage backend
    d) A logging tool

20. What type of code is used to define a Grafana dashboard, and how is it typically stored?

    a) YAML, in a separate configuration file
    b) JSON, in the Grafana database
    c) JSON, in the Prometheus database
    d) YAML, in the Alertmanager database
21. What is the role of the Data Source in Grafana?
    a) To provide the user interface
    b) To store metrics data
    c) To define the connection to the backend where the data is stored
    d) To manage user permissions

Coding Tasks

Task 1: Python Flask and Bash Script

1. Write a simple Python Flask application that will retrive a Chuck Norris joke from an API (https://api.chucknorris.io/jokes/random) and will return the joke when accessed at the root URL (/).

2. Write a Bash script (`curl_flask.sh`) that curls the root URL of the Flask application and prints the number of words in the joke.

3. Create a Git repository, commit the Python Flask application (app.py), the Bash script (curl_flask.sh), and push the repository to GitHub.

Task 2: Docker and Docker-Compose

1. Write a Dockerfile for this python script (The script - `joke.py` fetchs a random joke from an API (e.g., Official Joke API) and print it).

```
import requests

response =
requests.get("https://official-joke-api.appspot.com/random_joke")
if response.status_code == 200:
    joke = response.json()
    print(joke['setup'])
    print(joke['punchline'])
else:
    print("Failed to fetch joke")
```

2. Write a `docker-compose.yml` file to include the Python Flask application, Prometheus, and Grafana services (No need to create a custom configuration file).

3. Configure Grafana to use Prometheus as a data source through the Grafana UI. (add a screen shot of the data sources)

4. Upload the code to GitHub