

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

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- 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

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Coding Tasks

Task 1: Python Flask and Bash Script

1. Write a simple Python Flask application that will retrieve 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` fetches 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