

## Deploy a Multi-Tier Web Application On Kubernetes

```
master@master-vm: ~/multi-tier-application/nginx
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
Install the buildx component to build images with BuildKit:
https://docs.docker.com/go/buildx/

Sending build context to Docker daemon 8.192kB
Step 1/6 : FROM python:3.8
3.8: Pulling from library/python
cdd62bf39133: Pull complete
a47cfff7f31e9: Pull complete
a173f2aee8e9: Pull complete
01272fe8adba: Pull complete
cddc73e4e6c7: Pull complete
cc48f13b5f0f: Pull complete
5a98c896c047: Pull complete
Digest: sha256:d411270700143fa2683cc8264d9fa5d3279fd3b6afff62ae81ea2f9d070e390c
Status: Downloaded newer image for python:3.8
--> 3eadeaad4f17
Step 2/6 : WORKDIR /app
--> Running in 19b7ac10b279
--> Removed intermediate container 19b7ac10b279
--> 33d73ef63b70
Step 3/6 : COPY app.py .
--> a19a95850ba4
Step 4/6 : COPY requirements.txt .
--> 69a7af3140fd
Step 5/6 : RUN pip install --no-cache-dir -r requirements.txt
--> Running in b63f6f3a951b
Collecting Flask
  Downloading flask-3.0.3-py3-none-any.whl (101 kB)
    101.7/101.7 kB 3.3 MB/s eta 0:00:00
Collecting mysql-connector-python
  Downloading mysql_connector_python-9.0.0-cp38-cp38-manylinux_2_17_x86_64.whl (19.3 MB)
    19.3/19.3 MB 42.7 MB/s eta 0:00:00
Collecting itsdangerous>=2.1.2
  Downloading itsdangerous-2.2.0-py3-none-any.whl (16 kB)
```

```
master@master-vm: ~/multi-tier-application/nginx
Successfully built 4a9fc5a6b6c8
Successfully tagged bhargavakulla/flaskapp:latest
master@master-vm: ~/multi-tier-application/flask$ docker push bhargavakulla/flaskapp
Using default tag: latest
The push refers to repository [docker.io/bhargavakulla/flaskapp]
8805b32e6f27: Pushed
0aa4e7a26de3: Pushed
73a97d2d465a: Pushed
01e2b817dee1: Pushed
32ee710ca3c7: Mounted from library/python
1767e4d52b5a: Mounted from library/python
45b98afd69b3: Mounted from library/python
2bce433c3a29: Mounted from library/python
f91dc7a486d9: Mounted from library/python
3e14a6961052: Mounted from library/python
d50132f2fe78: Mounted from library/python
latest: digest: sha256:bd2b5c70e24336f56b5b877d2aba0dcd7732cb3dfe6c8650354a64784a2ebf52 size: 2628
master@master-vm: ~/multi-tier-application/flask$ kubectl apply -f flask-deployment.yaml
deployment.apps/flask-app created
master@master-vm: ~/multi-tier-application/flask$ kubectl apply -f flask-service.yaml
service/flask-service created
master@master-vm: ~/multi-tier-application/flask$ cd ..
master@master-vm: ~/multi-tier-application$ cd mysql/
master@master-vm: ~/multi-tier-application/mysql$ kubectl apply -f mysql-deployment.yaml
deployment.apps/mysql created
service/mysql created
master@master-vm: ~/multi-tier-application/mysql$ kubectl apply -f mysql-pv.yaml
persistentvolume/mysql-pv created
persistentvolumeclaim/mysql-pvc created
master@master-vm: ~/multi-tier-application/mysql$ kubectl apply -f mysql-secret.yaml
secret/mysql-secret created
master@master-vm: ~/multi-tier-application/mysql$ cd ..
master@master-vm: ~/multi-tier-application$ cd nginx/
master@master-vm: ~/multi-tier-application/nginx$ kubectl apply -f nginx-configmap.yaml
configmap/nginx-config created
master@master-vm: ~/multi-tier-application/nginx$ kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx created
master@master-vm: ~/multi-tier-application/nginx$ kubectl apply -f nginx-service.yaml
service/nginx-service created
```

```
master@master-vm: ~/multi-tier-application/mysql$ kubectl apply -f mysql-pv.yaml
persistentvolume/mysql-pv created
persistentvolumeclaim/mysql-pvc created
master@master-vm: ~/multi-tier-application/mysql$ kubectl apply -f mysql-secret.yaml
secret/mysql-secret created
master@master-vm: ~/multi-tier-application/mysql$ cd ..
master@master-vm: ~/multi-tier-application$ cd nginx/
master@master-vm: ~/multi-tier-application/nginx$ kubectl apply -f nginx-configmap.yaml
configmap/nginx-config created
master@master-vm: ~/multi-tier-application/nginx$ kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx created
master@master-vm: ~/multi-tier-application/nginx$ kubectl apply -f nginx-service.yaml
service/nginx-service created
```

```

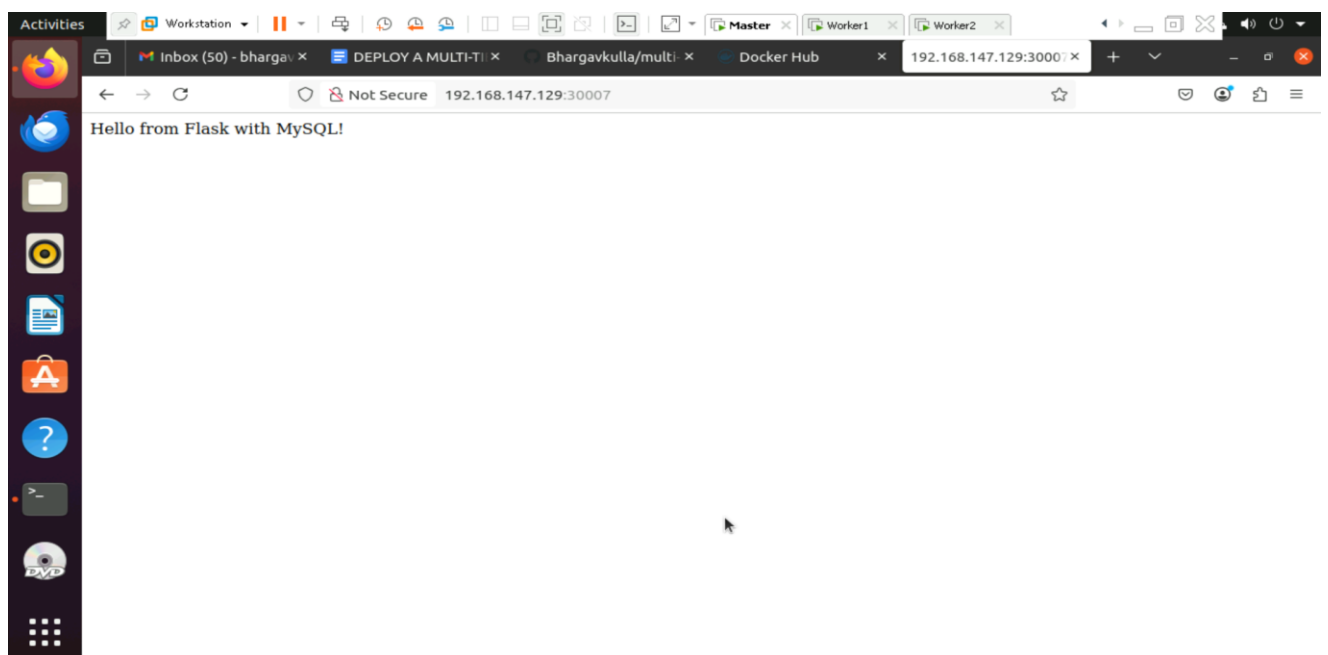
master@master-vm:~/multi-tier-application/nginx$ kubectl get all -o wide
NAME                                READY    STATUS    RESTARTS   AGE   IP              NODE             NOMINATED NODE   READINESS GATES
pod/flask-app-694d959f47-bvk8f      1/1     Running   0           7m12s  172.16.114.92   worker2-vm       <none>            <none>
pod/flask-app-694d959f47-fs2c6      1/1     Running   0           7m12s  172.16.114.91   worker2-vm       <none>            <none>
pod/flask-app-694d959f47-rlccq      1/1     Running   0           7m12s  172.16.94.227   worker1-vm       <none>            <none>
pod/flask-app-694d959f47-rwdt5      1/1     Running   0           7m12s  172.16.94.226   worker1-vm       <none>            <none>
pod/mysql-66d468f74c-6ggzz        1/1     Running   0           6m54s  172.16.114.93   worker2-vm       <none>            <none>
pod/nginx-78b5b78b99-796f9        1/1     Running   0           5m4s   172.16.114.95   worker2-vm       <none>            <none>

NAME                                TYPE                CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE   SELECTOR
service/flask-service               ClusterIP            10.107.176.49   <none>           5000/TCP         7m6s  app=flask
service/kubernetes                   ClusterIP            10.96.0.1       <none>           443/TCP         7m58s <none>
service/mysql                       ClusterIP            10.110.104.236  <none>           3306/TCP         6m54s app=mysql
service/nginx-service               NodePort             10.104.43.56    <none>           80:30007/TCP     6m21s app=nginx

NAME                                READY    UP-TO-DATE    AVAILABLE    AGE   CONTAINERS   IMAGES                               SELECTOR
deployment.apps/flask-app           4/4      4              4            7m13s  flask        bhargavakulla/flaskapp             app=flask
deployment.apps/mysql               1/1      1              1            6m54s  mysql        mysql:5.7                           app=mysql
deployment.apps/nginx               1/1      1              1            5m4s   nginx        nginx                               app=nginx

NAME                                DESIRED    CURRENT    READY    AGE   CONTAINERS   IMAGES                               SELECTOR
replicaset.apps/flask-app-694d959f47 4          4          4        7m13s  flask        bhargavakulla/flaskapp             app=flask,pod-templ
ate-hash=694d959f47
replicaset.apps/mysql-66d468f74c     1          1          1        6m54s  mysql        mysql:5.7                           app=mysql,pod-templ
ate-hash=66d468f74c
replicaset.apps/nginx-78b5b78b99     1          1          1        5m4s   nginx        nginx                               app=nginx,pod-templ
ate-hash=78b5b78b99

```



```

master@master-vm:~/multi-tier-application/mysql$ kubectl exec -it mysql-66d468f74c-6ggzz -- mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 3
Server version: 5.7.44 MySQL Community Server (GPL)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> CREATE DATABASE mydb;
ERROR 1007 (HY000): Can't create database 'mydb'; database exists
mysql> CREATE DATABASE mydata;
Query OK, 1 row affected (0.00 sec)

mysql> USE mydata;
Database changed
mysql> SHOW TABLES;
Empty set (0.00 sec)

mysql> CREATE TABLE users (
  id INT AUTO INCREMENT PRIMARY KEY
)

```

```
Activities Workstation Master Worker1 Worker2
master@master-vm: ~/multi-tier-application/mysql

mysql> USE mydata;
Database changed
mysql> SHOW TABLES;
Empty set (0.00 sec)

mysql> CREATE TABLE users (
  ->   id INT AUTO_INCREMENT PRIMARY KEY,
  ->   name VARCHAR(100),
  ->   email VARCHAR(100)
  -> );
Query OK, 0 rows affected (0.02 sec)

mysql> INSERT INTO users (name, email) VALUES ('Bhargav', 'bhargav@gmail.com');
Query OK, 1 row affected (0.03 sec)

mysql> INSERT INTO users (name, email) VALUES ('Prabhakar', 'prabhakar@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO users (name, email) VALUES ('Barath', 'barath@gmail.com');
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO users (name, email) VALUES ('Parakram', 'parakram@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM users;
+----+-----+-----+
| id | name  | email          |
+----+-----+-----+
| 1  | Bhargav | bhargav@gmail.com |
| 2  | Prabhakar | prabhakar@gmail.com |
| 3  | Barath  | barath@gmail.com |
| 4  | Parakram | parakram@gmail.com |
+----+-----+-----+
4 rows in set (0.00 sec)
```

```
Activities Workstation Master Worker1 Worker2
master@master-vm: ~/multi-tier-application/mysql

  ->   name VARCHAR(100),
  ->   email VARCHAR(100)
  -> );
Query OK, 0 rows affected (0.02 sec)

mysql> INSERT INTO users (name, email) VALUES ('Bhargav', 'bhargav@gmail.com');
Query OK, 1 row affected (0.03 sec)

mysql> INSERT INTO users (name, email) VALUES ('Prabhakar', 'prabhakar@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO users (name, email) VALUES ('Barath', 'barath@gmail.com');
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO users (name, email) VALUES ('Parakram', 'parakram@gmail.com');
Query OK, 1 row affected (0.01 sec)

mysql> SELECT * FROM users;
+----+-----+-----+
| id | name  | email          |
+----+-----+-----+
| 1  | Bhargav | bhargav@gmail.com |
| 2  | Prabhakar | prabhakar@gmail.com |
| 3  | Barath  | barath@gmail.com |
| 4  | Parakram | parakram@gmail.com |
+----+-----+-----+
4 rows in set (0.00 sec)

mysql> GRANT ALL PRIVILEGES ON mydb.* TO 'user'@'%';
Query OK, 0 rows affected (0.01 sec)

mysql> GRANT ALL PRIVILEGES ON mydata.* TO 'user'@'%';
Query OK, 0 rows affected (0.01 sec)

mysql>
```

Activities

Workstation

Inbox (50) - bhargav x DEPLOY A MULTI-TI x Bhargavkulla/multi x Docker Hub x 192.168.147.129:3000 x

192.168.147.129:3000/users

JSON Raw Data Headers

Save Copy Collapse All Expand All Filter JSON

```
0:
  email: "bhargav@gmail.com"
  id: 3
  name: "Bhargav"
1:
  email: "prabhakar@gmail.com"
  id: 4
  name: "Prabhakar"
2:
  email: "barathg@gmail.com"
  id: 5
  name: "Barath"
3:
  email: "parakram@gmail.com"
  id: 6
  name: "Parakram"
```