

" به نام خدا "

گزارش پروژه دوم رایانش ابری (داکر و مقدمات کوبرنتیز)


[مریم گلی - شماره دانشجویی: ۹۸۳۱۰۵۴]

گام اول:


- ارسال ایمیج ساخته شده بر روی داکرهاب و نتیجه ی آن

```
maryam@maryam-virtual-machine:~$ docker commit d7f93be30600 maryamgoli/curl-ubuntu:1.0
sha256:4793f8fd36edde98356b0bcd4a1921de9bf48faa675523a3725c9020395fd339

maryam@maryam-virtual-machine:~$ docker push maryamgoli/curl-ubuntu:1.0
The push refers to repository [docker.io/maryamgoli/curl-ubuntu]
0880dbd89951: Pushed
f4462d5b2da2: Mounted from library/ubuntu
1.0: digest: sha256:1dc461f89f23450226f8e2c45e24628c3bdfcee390a31a8eb8908a75cb0edc4d size: 741
maryam@maryam-virtual-machine:~$
```

 maryamgoli / curl-ubuntu

Description

Docker image based on ubuntu for running curl commands 

🕒 Last pushed: 2 minutes ago

Docker commands

To push a new tag to this repository,



```
docker push maryamgoli/curl-ubuntu:tagname
```

[Public View](#)

Tags and scans

🛡️ VULNERABILITY SCANNING - DISABLED [Enable](#)

This repository contains 1 tag(s).

Tag	OS	Type	Pulled	Pushed
 1.0		Image	---	2 minutes ago

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Automated Builds

Manually pushing images to Hub? Connect your account to GitHub or Bitbucket to automatically build and tag new images whenever your code is updated, so you can focus your time on creating.

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- نمایش لیست ایمیج های موجود بر روی سیستم خود

```
maryam@maryam-virtual-machine:~$ docker images
REPOSITORY          TAG         IMAGE ID      CREATED       SIZE
maryamgoli/curl-ubuntu 1.0        4793f8fd36ed 34 minutes ago 129MB
ubuntu              20.04      680e5dfb52c7 6 weeks ago   72.8MB
hello-world         latest     feb5d9fea6a5 14 months ago 13.3kB
maryam@maryam-virtual-machine:~$
```

- دریافت ایمیج ساخته شده از داکرهاب

```
maryam@maryam-virtual-machine:~$ docker pull maryamgoli/curl-ubuntu:1.0
1.0: Pulling from maryamgoli/curl-ubuntu
Digest: sha256:1dc461f89f23450226f8e2c45e24628c3bdfcee390a31a8eb8908a75cb0edc4d
Status: Image is up to date for maryamgoli/curl-ubuntu:1.0
docker.io/maryamgoli/curl-ubuntu:1.0
```

- ساختن کانتینر از ایمج دریافت شده از داکرهاب

```
maryam@maryam-virtual-machine:~$ docker container create -it --name curl-ubuntu maryamgoli/curl-ubuntu:1.0
2fd825f453a49cde95ed0f0b76db17e4a31a7a776d30fd1031a054ec67d6c25f
maryam@maryam-virtual-machine:~$ docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
2fd825f453a4	maryamgoli/curl-ubuntu:1.0	"bash"	7 seconds ago	Created		curl-ubuntu
d7f93be30600	ubuntu:20.04	"bash"	About an hour ago	Exited (0) About an hour ago		ubuntu

```
maryam@maryam-virtual-machine:~$
```

- اجرا دستور curl و نتیجه ی آن

```
maryam@maryam-virtual-machine:~$ docker container start --attach -i curl-ubuntu
root@2fd825f453a4:/# curl
curl: try 'curl --help' or 'curl --manual' for more information
root@2fd825f453a4:/# curl google.com
<HTML><HEAD><meta http-equiv="content-type" content="text/html; charset=utf-8">
<TITLE>301 Moved</TITLE></HEAD><BODY>
<H1>301 Moved</H1>
The document has moved
<A HREF="http://www.google.com/">here</A>.
</BODY></HTML>
root@2fd825f453a4:/#
```

گام دوم:

- دریافت ایمج ردیس و ساختن کانتینر از آن

```
maryam@maryam-virtual-machine:~$ docker pull redis
Using default tag: latest
latest: Pulling from library/redis
025c56f98b67: Pull complete
060e65aed679: Pull complete
b95291e865b7: Pull complete
7b879d654837: Pull complete
4538783c407f: Pull complete
ec5078f7c4e4: Pull complete
Digest: sha256:dfef5451fce377ab47c5bb6b6826592eea534279354bbfc3890c0b5e9b57c763
Status: Downloaded newer image for redis:latest
docker.io/library/redis:latest

maryam@maryam-virtual-machine:~$ docker run -d -p 6379:6379 --name redis redis
33c906b504a4645d9c51f394363e3407c3788429adb3ec7ef059d2a461424cb8
```

حذف کانتینر قبلی (redis) و ایجاد کانتینر اصلی (my-redis) بعد از ساخت network و volume:

```
maryam@maryam-virtual-machine:~$ docker stop redis
redis
maryam@maryam-virtual-machine:~$ docker rm redis
redis

maryam@maryam-virtual-machine:~$ docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
2fd825f453a4	maryamgoli/curl-ubuntu:1.0	"bash"	21 hours ago	Exited (0) 18 hours ago		curl-ubuntu
d7f93be30600	ubuntu:20.04	"bash"	22 hours ago	Exited (0) 22 hours ago		ubuntu

```
maryam@maryam-virtual-machine:~$ docker run -d -p 6379:6379 --name my-redis --volume my-volume --network my-network redis
1057960959d31400838ab87a94d5f8528df58898feed15b64aeea2205abcdfba
maryam@maryam-virtual-machine:~$ docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
1057960959d3	redis	"docker-entrypoint.s..."	4 seconds ago	Up 2 seconds	0.0.0.0:6379->6379/tcp, :::6379->6379/tcp	my-redis
2fd825f453a4	maryamgoli/curl-ubuntu:1.0	"bash"	21 hours ago	Exited (0) 18 hours ago		curl-ubuntu
d7f93be30600	ubuntu:20.04	"bash"	22 hours ago	Exited (0) 22 hours ago		ubuntu

```
maryam@maryam-virtual-machine:~$
```

- ساختن شبکه برای برقراری ارتباط بین دو کانتینر

```
maryam@maryam-virtual-machine:~$ docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
26555e04ff6c        bridge              bridge              local
0a2bc7ebd556        host                host                local
3d5eff662a55        none                null                local
maryam@maryam-virtual-machine:~$ docker network create my-network
66a0ec6df2c9291a1d4fd5bfdb437dbc55d7dc725f4bfadbfd57b30ff253c32c
maryam@maryam-virtual-machine:~$ docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
26555e04ff6c        bridge              bridge              local
0a2bc7ebd556        host                host                local
66a0ec6df2c9        my-network          bridge              local
3d5eff662a55        none                null                local
maryam@maryam-virtual-machine:~$
```

- ساختن Volume جهت persist کردن اطلاعات کش ردیس

```
maryam@maryam-virtual-machine:~$ docker volume ls
DRIVER      VOLUME NAME
local       1cdfcfa8ac2232a821377652079d72a8b467c90852e479d6133d409427535981
maryam@maryam-virtual-machine:~$ docker volume create my-volume
my-volume
maryam@maryam-virtual-machine:~$ docker volume ls
DRIVER      VOLUME NAME
local       1cdfcfa8ac2232a821377652079d72a8b467c90852e479d6133d409427535981
local       my-volume
maryam@maryam-virtual-machine:~$
```

- ساختن ایمج سرور نوشته شده با استفاده از داکر فایل

محتوای Dockerfile:

```

Open Dockerfile Save
~/Desktop/CC_Project2
1 FROM python:3.8-alpine
2
3 WORKDIR .
4
5 COPY requirements.txt .
6
7 RUN pip install -r requirements.txt
8
9 COPY . .
10
11 CMD ["python", "app.py"]
12
Dockerfile Tab Width: 8 Ln 1, Col 1 INS

```

```

maryam@maryam-virtual-machine:~$ docker build -t flaskserver:1.0 ./Desktop/CC_Project2
Sending build context to Docker daemon 8.704kB
Step 1/6 : FROM python:3.8-alpine
--> 1e9f5875386b
Step 2/6 : WORKDIR .
--> Running in 73bbee55acab
Removing intermediate container 73bbee55acab
--> ceadeff0af44
Step 3/6 : COPY requirements.txt .
--> da71c4acb533
Step 4/6 : RUN pip install -r requirements.txt
--> Running in 8a1271a963e0
Collecting flask
  Downloading Flask-2.2.2-py3-none-any.whl (101 kB)
    101.5/101.5 KB 154.8 kB/s eta 0:00:00
Collecting redis
  Downloading redis-4.4.0-py3-none-any.whl (236 kB)
    236.4/236.4 KB 427.1 kB/s eta 0:00:00
Collecting requests
  Downloading requests-2.28.1-py3-none-any.whl (62 kB)
    62.8/62.8 KB 2.5 MB/s eta 0:00:00
Collecting importlib-metadata>=3.6.0
  Downloading importlib_metadata-5.1.0-py3-none-any.whl (21 kB)
Collecting click>=8.0
  Downloading click-8.1.3-py3-none-any.whl (96 kB)
    96.6/96.6 KB 3.4 MB/s eta 0:00:00
Collecting Jinja2>=3.0
  Downloading Jinja2-3.1.2-py3-none-any.whl (133 kB)
    133.1/133.1 KB 2.3 MB/s eta 0:00:00
Collecting Werkzeug>=2.2.2
  Downloading Werkzeug-2.2.2-py3-none-any.whl (232 kB)
    232.7/232.7 KB 4.9 MB/s eta 0:00:00
Collecting itsdangerous>=2.0
  Downloading itsdangerous-2.1.2-py3-none-any.whl (15 kB)
Collecting async-timeout>=4.0.2
  Downloading async_timeout-4.0.2-py3-none-any.whl (5.8 kB)
Collecting idna<4,>=2.5
  Downloading idna-3.4-py3-none-any.whl (61 kB)
    61.5/61.5 KB 2.8 MB/s eta 0:00:00
Collecting urllib3<1.27,>=1.21.1
  Downloading urllib3-1.26.13-py2.py3-none-any.whl (140 kB)
    140.6/140.6 KB 2.6 MB/s eta 0:00:00
Collecting certifi>=2017.4.17
  Downloading certifi-2022.9.24-py3-none-any.whl (161 kB)
    161.1/161.1 KB 3.2 MB/s eta 0:00:00
Collecting charset-normalizer<3,>=2
  Downloading charset_normalizer-2.1.1-py3-none-any.whl (39 kB)
Collecting zipp>=0.5
  Downloading zipp-3.11.0-py3-none-any.whl (6.6 kB)
Collecting MarkupSafe>=2.0
  Downloading MarkupSafe-2.1.1-cp38-cp38-musllinux_1_1_x86_64.whl (29 kB)
Installing collected packages: zipp, urllib3, MarkupSafe, itsdangerous, idna, click, charset-normalizer, certifi, async-timeout, Werkzeug, requests, redis, Jinja2, importlib-metadata, flask
Successfully installed Jinja2-3.1.2 MarkupSafe-2.1.1 Werkzeug-2.2.2 async-timeout-4.0.2 certifi-2022.9.24 charset-normalizer-2.1.1 click-8.1.3 flask-2.2.2 idna-3.4 importlib-metadata-5.1.0 itsdangerous-2.1.2 redis-4.4.0 requests-2.28.1 urllib3-1.26.13 zipp-3.11.0
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is recommended to use a virtual environment instead: https://pip.pypa.io/warnings/venv
WARNING: You are using pip version 22.0.4; however, version 22.3.1 is available.
You should consider upgrading via the '/usr/local/bin/python -m pip install --upgrade pip' command.
Removing intermediate container 8a1271a963e0
--> 5ae6b3d46641
Step 5/6 : COPY . .
--> cc1a3bc1a727
Step 6/6 : CMD ["python", "app.py"]
--> Running in 1a9b481bdab4
Removing intermediate container 1a9b481bdab4
--> 349b7656a863
Successfully built 349b7656a863
Successfully tagged flaskserver:1.0


```


- ارسال ایمیج ساخته شده بر روی داکرهاب و نمایش نتیجه ی آن

```
maryam@maryam-virtual-machine:~$ docker tag flaskserver:1.0 maryamgoli/flaskserver:1.0
maryam@maryam-virtual-machine:~$ docker push maryamgoli/flaskserver:1.0
The push refers to repository [docker.io/maryamgoli/flaskserver]
faa50fffff8c3: Pushed
34b07f57a791: Pushed
cf8415def285: Pushed
039b0f7a3d4a: Mounted from library/python
f991ad4a2d6f: Mounted from library/python
2bf4ed1d0545: Mounted from library/python
3ebf1ad0dea4: Mounted from library/python
ded7a220bb05: Mounted from library/python
1.0: digest: sha256:bfbdb4f1115ed56f89b39eb282fe5ff819a6966f01d0c1079655ad1beca1b9bd size: 1993
maryam@maryam-virtual-machine:~$
```

maryamgoli / flaskserver

Description

A flask server that uses redis for storing names and prices of cryptocurrencies. 

 Last pushed: 5 minutes ago


Docker commands

[Public View](#)



To push a new tag to this repository,

```
docker push maryamgoli/flaskserver:tagname
```

Tags and scans

 VULNERABILITY SCANNING - DISABLED [Enable](#)

This repository contains 1 tag(s).

Tag	OS	Type	Pulled	Pushed
 1.0		Image	---	5 minutes ago

[See all](#)[Go to Advanced Image Management](#)

Automated Builds

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- نمایش اطلاعات ایمج سرور خود با استفاده از دستور `docker inspect`

```

maryam@maryan-virtual-machine:~$ docker inspect flaskserver:1.0
[
  {
    "Id": "sha256:e64e6295dd3b665026cacdaed139f7f8d0b27e6f163bf4d3e05466214fe48438",
    "RepoTags": [
      "flaskserver:1.0",
      "maryangoli/flaskserver:1.0"
    ],
    "RepoDigests": [
      "maryangoli/flaskserver@sha256:bfbdb4f1115ed56f89b39eb282fe5ff819a6966f01d0c1079655ad1beca1b9bd"
    ],
    "Parent": "sha256:4ea8af233114990a51afb9350c373b5027caf9887e6f0f36da3ad2fd0def300d",
    "Comment": "",
    "Created": "2022-12-10T07:14:26.675460151Z",
    "Container": "ff234fa9c3f7f41dfb9b939ca2c161e7e1d54a347e3656f5c8b02a7070f2f505",
    "ContainerConfig": {
      "Hostname": "ff234fa9c3f7",
      "Domainname": "",
      "User": "",
      "AttachStdin": false,
      "AttachStdout": false,
      "AttachStderr": false,
      "Tty": false,
      "OpenStdin": false,
      "StdinOnce": false,
      "Env": [
        "PATH=/usr/local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
        "LANG=C.UTF-8",
        "GPG_KEY=E3FF2839C048B25C084DEB9826995E310250568",
        "PYTHON_VERSION=3.8.15",
        "PYTHON_PIP_VERSION=22.0.4",
        "PYTHON_SETUPTOOLS_VERSION=57.5.0",
        "PYTHON_GET_PIP_URL=https://github.com/pypa/get-pip/raw/66030fa03382b4914d4c4d0896961a0bdeeeb274/public/get-pip.py",
        "PYTHON_GET_PIP_SHA256=1e501cf004eac1b7eb1f97266d28f995ae835d30250bec7f8850562703067dc6"
      ],
      "Cmd": [
        "/bin/sh",
        "-c",
        "#(nop) ",
        "CMD [\"python\" \"app.py\"]"
      ],
      "Image": "sha256:4ea8af233114990a51afb9350c373b5027caf9887e6f0f36da3ad2fd0def300d",
      "Volumes": null,
      "WorkingDir": "/",
      "Entrypoint": null,
      "OnBuild": null,
      "Labels": {}
    },
    "DockerVersion": "20.10.21",
    "Author": "",
    "Config": {
      "Hostname": "",
      "Domainname": "",
      "User": "",
      "AttachStdin": false,
      "AttachStdout": false,
      "AttachStderr": false,
      "Tty": false,
      "OpenStdin": false,
      "StdinOnce": false,
      "Env": [
        "PATH=/usr/local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
        "LANG=C.UTF-8",
        "GPG_KEY=E3FF2839C048B25C084DEB9826995E310250568",
        "PYTHON_VERSION=3.8.15",
        "PYTHON_PIP_VERSION=22.0.4",
        "PYTHON_SETUPTOOLS_VERSION=57.5.0",
        "PYTHON_GET_PIP_URL=https://github.com/pypa/get-pip/raw/66030fa03382b4914d4c4d0896961a0bdeeeb274/public/get-pip.py",
        "PYTHON_GET_PIP_SHA256=1e501cf004eac1b7eb1f97266d28f995ae835d30250bec7f8850562703067dc6"
      ],
      "Cmd": [
        "python",
        "app.py"
      ],
      "Image": "sha256:4ea8af233114990a51afb9350c373b5027caf9887e6f0f36da3ad2fd0def300d",
      "Volumes": null,
      "WorkingDir": "/",
      "Entrypoint": null,
      "OnBuild": null,
      "Labels": null
    },
    "Architecture": "amd64",
    "Os": "linux",
    "Size": 64405708,
    "VirtualSize": 64405708,
    "GraphDriver": {
      "Data": {
        "LowerDir": "/var/lib/docker/overlay2/cbfe674c9191799758488eac60a5af3010df985fb742016628991d1de740df22/df/f:/var/lib/docker/overlay2/8ee8a19c9a0192385a581d147524e81a2f32fc23c9977f1f7dbef4628278026/df/f:/var/lib/docker/overlay2/f2fec20cd0b27e5025840119a31c0bad6fb0529b4f3633a322df815f72292/df/f:/var/lib/docker/overlay2/6f792def5e3f0f6b9c4413703d7440d81f7ea56c595c9b8622b95a1d17b238c/df/f:/var/lib/docker/overlay2/36e21f91343d3e715366f6718311287b7cd5132a733bae17d291414f64fa2fa/df/f:/var/lib/docker/overlay2/113793deedcabb7cc7ae32d26e79e7b2814bc9afe465aa92eef67bfe202b7e5f/df/f:/var/lib/docker/overlay2/bf5a662e463487ebef7074e2b93f9553c118960ad0bcec830a0faa280c4fb84e/df/f",
        "MergedDir": "/var/lib/docker/overlay2/ba539406850c39793d2e2cd566d167d3996ebf5f08c23e78a52c258f0bd38701/merged",
        "UpperDir": "/var/lib/docker/overlay2/ba539406850c39793d2e2cd566d167d3996ebf5f08c23e78a52c258f0bd38701/df/f",
        "WorkDir": "/var/lib/docker/overlay2/ba539406850c39793d2e2cd566d167d3996ebf5f08c23e78a52c258f0bd38701/work"
      }
    },
    "Name": "overlay2"
  },
  {
    "RootFS": {
      "Type": "layers",
      "Layers": [
        "sha256:ded7a220bb058e28ee3254fba04ca90b679070424424761a53a043b93b612bf",
        "sha256:3ebf1ad0dea4c492048aae223adf3db60d88cbae0ed96af5f061191297011960",
        "sha256:2bf4ed1d05458cb43130725476eae1306398ce7800bcbfd2c03925bbd9ec5187",
        "sha256:f991ad4a2d6f8729c6f1861dfcea80dc115786a185d5cc0eb390dc569a6fe7c0",
        "sha256:039b0f7a3d4a9c66cd7ec95cf01ada27927d55f8ade4b3c9afa26adb863de0",
        "sha256:c8415def285e5c2e7ec1deb352cb35f7a2d67c8083db2a04c5c2d9953bc0058",
        "sha256:34b07f57a79128fd239331cf14e899c7151b270019e36e89106332fc4d8b0011",
        "sha256:faa50ffff8c3370ae210d5cae3db5eff32f91ab4fd1859b7323260034391e914"
      ]
    },
    "Metadata": {
      "LastTagTime": "2022-12-10T02:16:17.892013302-05:00"
    }
  }
]
maryam@maryan-virtual-machine:~$

```

- نمایش کانتینر های موجود در سیستم خود با استفاده از دستور `docker ps`

```

maryam@maryam-virtual-machine:~$ docker run -d -it -p 5000:5000 --network my-network --name flaskserver flaskserver:1.0
e784fda093e19f0021767d850c7cbf673099995bf52750bfaa705a1437b8b73
maryam@maryam-virtual-machine:~$ docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS                                                                 NAMES
e784fda093e1   flaskserver:1.0  "python app.py"         10 seconds ago  Up 8 seconds  0.0.0.0:5000->5000/tcp, :::5000->5000/tcp  flaskserver
e4cef27c4a9e   redis          "docker-entrypoint.s..." 38 hours ago   Up 37 minutes  0.0.0.0:6379->6379/tcp, :::6379->6379/tcp  my-redis
maryam@maryam-virtual-machine:~$

```

تغییر مقدار متغیر های محیطی با `--env` در هنگام ساخت کانتینر `flaskserver`:

- `--env PORT=5000`
- `--env API_KEY="YOUR_API_KEY"`
- `--env CRYPTOCURRENCY_NAME="btc"`
- `--env EXPIRATION_TIME_MINUTE=5`

مثال ساخت کانتینر `flaskserver`:

```

docker run --env CRYPTOCURRENCY_NAME=bnb --env PORT=9000 -d -it -p 5000:9000
--network my-network --name flaskserver flaskserver:1.0

```

ارسال درخواست به سرور:

```
curl localhost:5000
```

- نمایش میزان منابع استفاده شده توسط کانتینر های موجود با استفاده از دستور `docker stats`

CONTAINER ID	NAME	CPU %	MEM USAGE / LIMIT	MEM %	NET I/O	BLOCK I/O	PIDS
e784fda093e1	flaskserver	2.31%	50.71MiB / 3.799GiB	1.30%	3.25kB / 0B	2.46MB / 0B	3
e4cef27c4a9e	my-redis	0.23%	6.316MiB / 3.799GiB	0.16%	5.94kB / 974B	13.1MB / 0B	5

گام سوم:

- نشان دادن صحت ایجاد منابع بر روی کلاستر `minikube` با استفاده از دستور `kubectl get`

```

maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get configmap
NAME          DATA  AGE
flaskserver-configmap  4      29m
kube-root-ca.crt      1      7d19h
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get deployment
NAME          READY  UP-TO-DATE  AVAILABLE  AGE
flaskserver   2/2    2            2          29m
redis         1/1    1            1          28m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get service
NAME          TYPE        CLUSTER-IP    EXTERNAL-IP  PORT(S)    AGE
flaskserver-service  ClusterIP   10.99.115.63  <none>       80/TCP     29m
kubernetes       ClusterIP   10.96.0.1     <none>       443/TCP    7d19h
redis-service     ClusterIP   10.108.106.93 <none>       6379/TCP   28m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get pod
NAME          READY  STATUS    RESTARTS  AGE
flaskserver-78f5757657-5p768  1/1    Running   0          29m
flaskserver-78f5757657-jssrc  1/1    Running   0          29m
redis-866d9dc884-5j7m6        1/1    Running   0          29m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get pv
NAME          CAPACITY  ACCESS MODES  RECLAIM POLICY  STATUS  CLAIM                STORAGECLASS  REASON  AGE
redis-persistentvolume  50Mi      RWO           Retain          Bound   default/redis-persistentvolumeclaim  manual    29m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get pvc
NAME          STATUS  VOLUME          CAPACITY  ACCESS MODES  STORAGECLASS  AGE
redis-persistentvolumeclaim  Bound   redis-persistentvolume  50Mi      RWO           manual        29m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$

```

- نشان دادن آدرس IP پاد ها با استفاده از endpoint

```
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get ep
NAME                ENDPOINTS                                AGE
flaskserver-service 172.17.0.3:5000,172.17.0.5:5000         32m
kubernetes           192.168.49.2:8443                       7d19h
redis-service        172.17.0.6:6379                         32m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$
```

گام چهارم:

```
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl run curl-pod --image=maryamgoll/curl-ubuntu:1.0 -it
If you don't see a command prompt, try pressing enter.
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-jssrc",
  "name": "Bitcoin",
  "price": "16837.935686064022"
}
```

- نشان دادن صحت ایجاد پاد مربوط به curl

```
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get pod
NAME                READY   STATUS    RESTARTS   AGE
curl-pod            1/1     Running   1 (9s ago)  56s
flaskserver-78f5757657-5p768  1/1     Running   0           115m
flaskserver-78f5757657-jssrc  1/1     Running   0           115m
redis-866d9dc884-5j7m6  1/1     Running   0           114m
```

- نشان دادن توزیع بار میان پاد ها ← با مشاهده ی hostname موجود در پاسخ ها، می توان فهمید که وظیفه ی پاسخ به درخواست های ارسال شده، بین دو پاد flaskserver تقسیم شده است و توزیع بار اتفاق افتاده است.

```
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl get pod
NAME                READY   STATUS    RESTARTS   AGE
curl-pod            1/1     Running   1 (7m59s ago)  8m46s
flaskserver-78f5757657-5p768  1/1     Running   0           123m
flaskserver-78f5757657-jssrc  1/1     Running   0           123m
redis-866d9dc884-5j7m6  1/1     Running   0           122m
maryam@maryam-virtual-machine:~/Desktop/CC_Project2/Section_3/k8s-deployment$ kubectl exec curl-pod -it -- bash
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-jssrc",
  "name": "Bitcoin",
  "price": "16828.237904807465"
}
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-5p768",
  "name": "Bitcoin",
  "price": "16828.237904807465"
}
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-jssrc",
  "name": "Bitcoin",
  "price": "16828.237904807465"
}
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-5p768",
  "name": "Bitcoin",
  "price": "16828.237904807465"
}
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-jssrc",
  "name": "Bitcoin",
  "price": "16828.237904807465"
}
root@curl-pod:/# curl flaskserver-service
{
  "hostname": "flaskserver-78f5757657-jssrc",
  "name": "Bitcoin",
  "price": "16828.237904807465"
}
```