

## به نام خدا

گزارش تمرین دوم رایانش ابری

محمدعلی کشت پرور ۹۷۳۴۰۲۲

### گام اول

(۱) ساخت و ارسال ایمیج ساخته شده روی داکرهاب و نمایش نتایج آن

```
└─(20:10:37)─> docker build . -t curl-alpine:1.0
└─(Mon,Mar21)─┘
Sending build context to Docker daemon 2.048kB
Step 1/3 : FROM alpine:3.15
3.15: Pulling from library/alpine
Digest: sha256:d6d0a0eb4d40ef96f2310ead734848b9c819bb97c9d846385c4aca1767186cd4
Status: Downloaded newer image for alpine:3.15
--> e9adb5357e84
Step 2/3 : LABEL maintainer="MohammadKeshtparvar <mohammad.kp2000@gmail.com>"
--> Running in 387f366d4e4f
Removing intermediate container 387f366d4e4f
--> ddfb89ea7e70
Step 3/3 : RUN apk update && apk add curl
--> Running in e02aa235a1ea
fetch https://dl-cdn.alpinelinux.org/alpine/v3.15/main/x86_64/APKINDEX.tar.gz
fetch https://dl-cdn.alpinelinux.org/alpine/v3.15/community/x86_64/APKINDEX.tar.gz
v3.15.1-6-gbd9138885d [https://dl-cdn.alpinelinux.org/alpine/v3.15/main]
v3.15.1-11-g82674842ec [https://dl-cdn.alpinelinux.org/alpine/v3.15/community]
OK: 15855 distinct packages available
(1/5) Installing ca-certificates (20211220-r0)
(2/5) Installing brotli-libs (1.0.9-r5)
(3/5) Installing nghttp2-libs (1.46.0-r0)
(4/5) Installing libcurl (7.80.0-r0)
(5/5) Installing curl (7.80.0-r0)
Executing busybox-1.34.1-r4.trigger
Executing ca-certificates-20211220-r0.trigger
OK: 8 MiB in 19 packages
Removing intermediate container e02aa235a1ea
--> d02e1cf0a416
Successfully built d02e1cf0a416
Successfully tagged curl-alpine:1.0
```

### ساخت ایمیج

```
└─(20:23:49)─> docker image push mohamad2000/curl-alpine:1.0
The push refers to repository [docker.io/mohamad2000/curl-alpine]
51d0ee0cffa6: Pushed
5e03d8cae877: Mounted from library/alpine
1.0: digest: sha256:7c9be230f9503bd9ffab91455563a9e44da807336fe59a256e3b539f5d579f7f size: 739
```

### ارسال ایمیج روی داکرهاب

(۲) دریافت ایمیج از داکرهاب

```
└─(20:28:51)─> docker pull mohamad2000/curl-alpine:1.0
1.0: Pulling from mohamad2000/curl-alpine
Digest: sha256:7c9be230f9503bd9ffab91455563a9e44da807336fe59a256e3b539f5d579f7f
Status: Image is up to date for mohamad2000/curl-alpine:1.0
docker.io/mohamad2000/curl-alpine:1.0
└─(20:29:37)─> docker image ls
REPOSITORY          TAG          IMAGE ID       CREATED        SIZE
curl-alpine         1.0          d02e1cf0a416  19 minutes ago 9.97MB
mohamad2000/curl-alpine 1.0          d02e1cf0a416  19 minutes ago 9.97MB
redis               5            4a0ce0091049  3 days ago    110MB
ubuntu              20.04        ff0fea8310f3  3 days ago    72.8MB
nginx                latest       f2f70adc5d89  3 days ago    142MB
```

۳) اجرای ایمپج دریافت شده از داکرهاب و خروجی دستور curl

```
docker run -it --rm --name test-curl-alpine mohamad2000/curl-alpine:1.0
/ # 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>
/ #
```

اجرای ایمپج ساخته شده (همانطور که مشاهده می شود ابزار curl روی این container نصب شده است).

## گام دوم

۱) build کردن ایمپج با استفاده از Dockerfile ایجاد شده

```
mohammad@mohammad-HP-Laptop-15-da0xxx:~/Documents/uni/term8/cloud-computing/project/9734022_hw2/temprature-status$ docker build . -t temperature-status:1.0
Sending build context to Docker daemon 22.02kB
Step 1/14 : FROM golang:1.18-alpine AS build
--> 0e3b02146c47
Step 2/14 : LABEL maintainer="Mohammadali Keshtparvar"
--> Using cache
--> f9fac52e79aa
Step 3/14 : WORKDIR /app
--> Using cache
--> 580264a4a16f
Step 4/14 : COPY go.mod go.sum ./
--> Using cache
--> 22fb4e060a68
Step 5/14 : RUN go mod download
--> Using cache
--> 85332ffa5080
Step 6/14 : COPY . .
--> aa222f170f53
Step 7/14 : WORKDIR /app/cmd
--> Running in 4000b8e5fa29
Removing intermediate container 4000b8e5fa29
--> 5ac76c5471da
Step 8/14 : RUN CGO_ENABLED=0 GO_OS=linux go build -a -installsuffix cgo -o /out .
--> Running in f01e81402bc6
Removing intermediate container f01e81402bc6
--> be6d5ba11716
Step 9/14 : FROM alpine:3.15
--> e9adb5357e84
Step 10/14 : RUN apk --no-cache add ca-certificates
--> Using cache
--> edadae2a6ec0
Step 11/14 : WORKDIR /app/
--> Using cache
--> 9510b28d135a
Step 12/14 : COPY --from=build /out .
--> Using cache
--> d18bf15a0afe
Step 13/14 : COPY config.yml .
--> 78c1091c576d
Step 14/14 : CMD ["/out"]
--> Running in 7f63c678a589
Removing intermediate container 7f63c678a589
--> 05b4232de726
Successfully built 05b4232de726
Successfully tagged temperature-status:1.0
```

ساخت ایمپج از روی داکر فایل

```

(19:00:17) -> docker image ls
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
temperature-status  1.0                05b4232de726      55 seconds ago    15.1MB
<none>              <none>             be6d5ba11716      59 seconds ago    476MB
<none>              <none>             e9fa4153be77      10 minutes ago    15.1MB
<none>              <none>             e91eb6e54a1a      11 minutes ago    476MB
curl-alpine         1.0                d02e1cf0a416      22 hours ago      9.97MB
mohamad2000/curl-alpine 1.0                d02e1cf0a416      22 hours ago      9.97MB
redis               5                  4a0ce0091049      4 days ago        110MB
ubuntu             20.04             ff0fea8310f3      4 days ago        72.8MB
nginx              latest            f2f70adc5d89      4 days ago        142MB
golang             1.18-alpine       0e3b02146c47      5 days ago        329MB
python             3.8-alpine        b4722154b615      5 days ago        46.9MB
alpine             3.15              e9adb5357e84      5 days ago        5.57MB
alpine             latest            e9adb5357e84      5 days ago        5.57MB
mariadb            10.2              0af15a0064e3      11 days ago       338MB
ubuntu             latest            2b4cba85892a      2 weeks ago       72.8MB
hello-world        latest            feb5d9fea6a5      5 months ago      13.3kB
golang             1.15-alpine       1403af3b6d4a      7 months ago      300MB

```

نمایش ایمج ساخته شده (temperature-status:1.0)

۲) ارسال ایمج ساخته شده به داکرهاب و نمایش نتایج آن

```

mohammad@mohammad-HP-Laptop-15-da0xxx:~/Documents/uni/term8/cload-computing/project/5
(19:11:29) -> docker tag temperature-status:1.0 mohamad2000/temperature-status:1.0
(19:11:31) ->

```

قبل از پوش کردن tag می زنیم

```

(~/Documents/uni/term8/cload-computing/project/9734022_hw2/temprature-status)
(19:11:31) -> docker image push mohamad2000/temperature-status:1.0
The push refers to repository [docker.io/mohamad2000/temperature-status]
dd532e117454: Pushed
5e17a0fbdd78: Pushed
9a919b2d486d: Pushed
cf08619e0b52: Pushed
5e03d8cae877: Mounted from mohamad2000/curl-alpine
1.0: digest: sha256:c65d3d717ee9fdb17fbe15884c654809f3956d30ebd966e21713161c8e578e35 size: 1363
(~/Documents/uni/term8/cload-computing/project/9734022_hw2/temprature-status)
(19:13:35) ->

```

پوش کردن روی داکرهاب

### (۳) تست ایمیج ساخته شده روی سیستم شخصی

```

docker run --rm --name temperature-status-test -p 8081:8081 190x25
[~/Documents/uni/term8/cloud-computing/project/9734022_hw2/temperature-status] mohammad@mohammad-HP-Laptop-15-da0xxx:pts/0
[19:15:09] → docker run --rm --name temperature-status-test -p 8081:8081 temperature-status:1.0
2022/03/22 14:45:12 HTTP server started on port : 8081
2022/03/22 14:45:23 response : {"request":{"type":"City","query":"Tehran, Iran","language":"en","unit":"m"},"location":{"name":"Tehran","country":"Iran","region":"Tehran","lat":"35.726","lon":"51.330","timezone_id":"Asia/Tehran","localtime":"2022-03-22 19:15","localtime_epoch":1647976500,"utc_offset":"+4:50"},"current":{"observation_time":"02:45 PM","temperature":13,"weather_icons":["https://assets.weatherstack.com/images/bsymbols01.png_64/bsymbol_0002_sunny_intervals.png"],"weather_descriptions":["Partly cloudy"],"wind_speed":15,"wind_degree":300,"wind_dir":"WNW","pressure":1014,"precip":3.6,"humidity":58,"cloudcover":75,"feelslike":12,"uv_index":3,"visibility":10,"is_day":"yes"}}
[~/Documents/uni/term8/cloud-computing/project/9734022_hw2/temperature-status] mohammad@mohammad-HP-Laptop-15-da0xxx:pts/2
[19:15:10] → curl localhost:8081/ | jq
% Total % Received % Xferd Average Speed Time Time Time Current
Dload Upload Total Spent Left Speed
100 136 100 136 0 0 161 0 --:--:-- --:--:-- --:--:-- 161
{
  "hostname": "6593abc72c33",
  "temperature": "13",
  "weather_descriptions": "Partly cloudy",
  "wind_speed": "15",
  "humidity": "58",
  "feelslike": "12"
}

```

### گام سوم

#### (۱) نمایش دادن صحت ایجاد منابع بر روی کلاستر

```

→ deployment kubectl create configmap config-map -o yaml --from-file=./config.yaml > config-map.yaml
→ deployment

```

#### ساخت config-map.yaml

```

→ deployment kubectl apply -f deployment.yaml
deployment.apps/temperature-status-deployment created
→ deployment kubectl get deployment
NAME                                READY    UP-TO-DATE    AVAILABLE    AGE
temperature-status-deployment      0/2      2              0            26s
→ deployment

```

```

→ deployment kubectl apply -f temperature-status-service.yaml
service/temperature-status-service created
→ deployment

```

```

→ ~ kubectl get cm
NAME          DATA      AGE
config-map    1          87m
kube-root-ca.crt 1          10h
→ ~ kubectl get deployment -o wide
NAME          READY    UP-TO-DATE    AVAILABLE    AGE    CONTAINERS    IMAGES    SELECT
OR
temperature-status-deployment 2/2      2              2            49m    temperature-status    mohamad2000/temperature-status:1.0    app=te
mperature-status-deployment
→ ~ kubectl get pods -o wide
NAME          READY    STATUS    RESTARTS    AGE    IP          NODE    NOMINATED NODE    READINESS GATES
temperature-status-deployment-5448894bf5-skkjc 1/1      Running    0           41m    172.17.0.3    minikube    <none>            <none>
temperature-status-deployment-5448894bf5-whj9d 1/1      Running    0           40m    172.17.0.4    minikube    <none>            <none>
→ ~ kubectl get svc
NAME          TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)    AGE
kubernetes    ClusterIP   10.96.0.1     <none>         443/TCP    10h
temperature-status-service ClusterIP   10.101.226.171 <none>         81/TCP     5m
→ ~

```

صحت منابع روی کلاستر(همانطور که مشاهده می شود منابع به درستی ایجاد شده اند و پادها در حال اجرا هستند).

(۲) آدرس IP پادها و نحوه برقراری ارتباط میان آن ها و سرویس ساخته شده

```

→ deployment kubectl get pods -o wide
NAME          READY    STATUS    RESTARTS    AGE    IP          NODE    NOMINATED NODE    READINESS GATES
temperature-status-deployment-5448894bf5-skkjc 1/1      Running    0           25m    172.17.0.3    minikube    <none>            <none>
temperature-status-deployment-5448894bf5-whj9d 1/1      Running    0           24m    172.17.0.4    minikube    <none>            <none>
→ deployment

```

IP پادها در این تصویر مشخص است

برای ارتباط با سرور باید endpoint ها ایجاد شوند.

```

→ ~ kubectl get endpoints
NAME          ENDPOINTS                                     AGE
kubernetes    192.168.49.2:8443                            10h
temperature-status-service 172.17.0.3:8081,172.17.0.4:8081    15m
→ ~

```

گام آخر

(۱) نمایش صحت ایجاد پادها بر روی کلاستر

```

temperature-status-service 172.17.0.3:8081,172.17.0.4:8081 15m
→ ~ kubectl get pods
NAME          READY    STATUS    RESTARTS    AGE
temperature-status-deployment-5448894bf5-skkjc 1/1      Running    0           53m
temperature-status-deployment-5448894bf5-whj9d 1/1      Running    0           52m
test-797584c647-qwksv 1/1      Running    0           3m5s
→ ~

```



۲) نمایش ارسال درخواست و توزیع بار بین دو پاد ایجاد شده

```
→ ~ kubectl exec test-797584c647-lppmp -it -- curl temperature-status-service:81 | jq
{
  "hostname": "temperature-status-deployment-5448894bf5-skkjc",
  "temperature": "18",
  "weather_descriptions": "Partly cloudy",
  "wind_speed": "22",
  "humidity": "30",
  "feelslike": "18"
}
→ ~ kubectl exec test-797584c647-lppmp -it -- curl temperature-status-service:81 | jq
{
  "hostname": "temperature-status-deployment-5448894bf5-whj9d",
  "temperature": "18",
  "weather_descriptions": "Partly cloudy",
  "wind_speed": "22",
  "humidity": "30",
  "feelslike": "18"
}
→ ~ kubectl exec test-797584c647-lppmp -it -- curl temperature-status-service:81 | jq
{
  "hostname": "temperature-status-deployment-5448894bf5-skkjc",
  "temperature": "18",
  "weather_descriptions": "Partly cloudy",
  "wind_speed": "22",
  "humidity": "30",
  "feelslike": "18"
}
→ ~ kubectl exec test-797584c647-lppmp -it -- curl temperature-status-service:81 | jq
{
  "hostname": "temperature-status-deployment-5448894bf5-whj9d",
  "temperature": "18",
  "weather_descriptions": "Partly cloudy",
  "wind_speed": "22",
  "humidity": "30",
  "feelslike": "18"
}
```

همانطور که مشاهده می شود با توجه به `hostname`ها، درخواست ها بین دو پاد ایجاد شده تقسیم می شوند.

۳) دستور مورد استفاده برای اجرا کردن ایمپج گام اول

```
→ ~ kubectl run curl-alpine --image=mohamad2000/curl-alpine:1.0 -it
If you don't see a command prompt, try pressing enter.
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Partly cloudy","wind_speed":"22","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-skkjc","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-skkjc","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-whj9d","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-skkjc","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ # curl temperature-status-service:81
{"hostname":"temperature-status-deployment-5448894bf5-skkjc","temperature":"18","weather_descriptions":"Sand","wind_speed":"30","humidity":"30","feelslike":"18"}
/ #
```

برای اجرای ایمپج گام اول از دستور تصویر بالا استفاده می کنیم.