

19MAM57 - CLOUD COMPUTING LAB - CAT 2

TEAM MEMBERS : AVANTHIKA K (19 34 003)
KAVYA K (19 34 016)

DEMONSTRATION OF THE DOCKER FEATURES :

(1) DOCKER BUILD :

```
(base) Vivekas-MacBook-Air:~ Kavya$ docker build -t classroom:latest .
[+] Building 9.5s (7/7) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 88B
=> [internal] load .dockerignore
=> => transferring context: 2B
=> [internal] load metadata for docker.io/library/nginx:alpine
=> [internal] load build context
=> => transferring context: 306.81kB
=> [1/2] FROM docker.io/library/nginx:alpine@sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd1d4d3
=> resolve docker.io/library/nginx:alpine@sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd1d4d3
=> sha256:8d6ba530f6489d12676d7f61628427d067243ba4a3a512c3e28813b977cb3b0e 7.34MB / 7.34MB
=> sha256:bef258acf10dc257d641c47c3a600c92f87be4b4ce4a5e4752b3eade7533dcd9 8.89kB / 8.89kB
=> sha256:59bf1c3509f33515622619af21ed55bbe26d24913cedbca106468a5fb37a50c3 2.82MB / 2.82MB
=> sha256:5288d7ad7a7f84bdd19c1e8f0abb8684b5338f3da86fe9ae1d7f0e9bc2de6595 601B / 601B
=> sha256:da9c94bec1da829ebd52431a84502ec471c8e548ffb2cedbf36260fd9bd1d4d3 1.65kB / 1.65kB
=> sha256:050385609d832fae11b007fbbfba77d0bba12bf72bc0dca0ac03e09b1998580f 1.57kB / 1.57kB
=> extracting sha256:59bf1c3509f33515622619af21ed55bbe26d24913cedbca106468a5fb37a50c3
=> sha256:39e51c61c033442d00c40a30b2a9ed01f40205875fbd8664c50b4dc3e99ad5cf 894B / 894B
=> sha256:ee6f71c6f4a82b2af0d1f92bd76be0079364d03020e8a2c569062e1c06d3822b 665B / 665B
=> sha256:f2303c6c88653b9a6739d50f611c170b9d97d161c6432409c680f6b46a5f112f 1.39kB / 1.39kB
=> extracting sha256:8d6ba530f6489d12676d7f61628427d067243ba4a3a512c3e28813b977cb3b0e
=> extracting sha256:5288d7ad7a7f84bdd19c1e8f0abb8684b5338f3da86fe9ae1d7f0e9bc2de6595
=> extracting sha256:39e51c61c033442d00c40a30b2a9ed01f40205875fbd8664c50b4dc3e99ad5cf
=> extracting sha256:ee6f71c6f4a82b2af0d1f92bd76be0079364d03020e8a2c569062e1c06d3822b
=> extracting sha256:f2303c6c88653b9a6739d50f611c170b9d97d161c6432409c680f6b46a5f112f
=> [2/2] COPY . /usr/share/nginx/html
=> exporting to image
=> exporting layers
=> writing image sha256:7cfacff0d642d32ab7d8d2a964f428474fb2df556c1228d3f7b94c3067607ecc
=> naming to docker.io/library/classroom:latest
```

(2) IMAGE CATCHING :

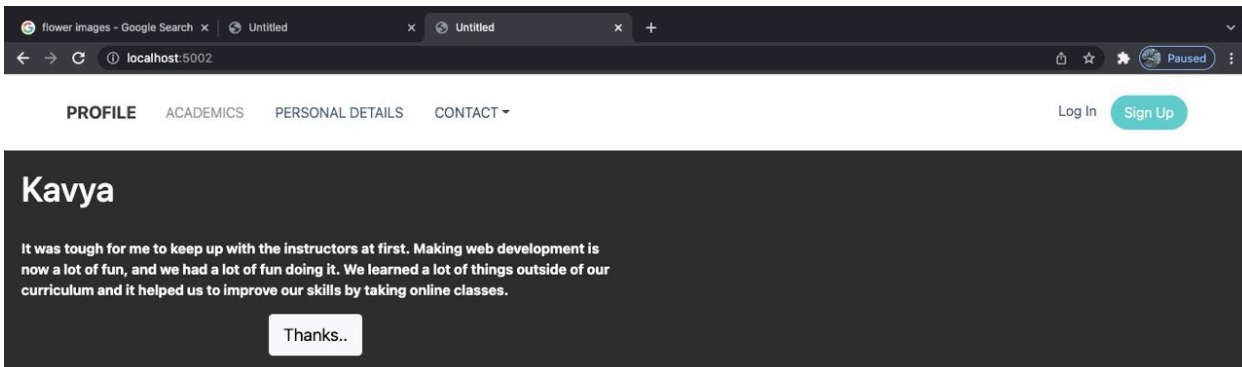
Current Layer Contents				
Layer	Permission	UID:GID	Size	Filetree
0	drwxr-xr-x	0:0	878 kB	bin
1	-rwxrwxrwx	0:0	0 B	arch → /bin/busybox
2	-rwxrwxrwx	0:0	0 B	ash → /bin/busybox
3	-rwxrwxrwx	0:0	0 B	base64 → /bin/busybox
4	-rwxrwxrwx	0:0	0 B	bbconfig → /bin/busybox
5	-rwxr-xr-x	0:0	878 kB	busybox
6	-rwxrwxrwx	0:0	0 B	cat → /bin/busybox
	-rwxrwxrwx	0:0	0 B	chgrp → /bin/busybox
	-rwxrwxrwx	0:0	0 B	chmod → /bin/busybox
	-rwxrwxrwx	0:0	0 B	chown → /bin/busybox
	-rwxrwxrwx	0:0	0 B	cp → /bin/busybox
	-rwxrwxrwx	0:0	0 B	date → /bin/busybox
	-rwxrwxrwx	0:0	0 B	dd → /bin/busybox
	-rwxrwxrwx	0:0	0 B	df → /bin/busybox
	-rwxrwxrwx	0:0	0 B	dmesg → /bin/busybox
	-rwxrwxrwx	0:0	0 B	dnsdomainname → /bin/busybox
	-rwxrwxrwx	0:0	0 B	dumpkmap → /bin/busybox
	-rwxrwxrwx	0:0	0 B	echo → /bin/busybox
	-rwxrwxrwx	0:0	0 B	ed → /bin/busybox
	-rwxrwxrwx	0:0	0 B	egrep → /bin/busybox
	-rwxrwxrwx	0:0	0 B	false → /bin/busybox

^C Quit | Tab Switch view | ^F Filter | ^L Show layer changes | ^A Show aggregated

(3) CONTAINER DEPLOYMENT :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ docker run -p 5001:80 classroom:latest
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2022/01/28 16:50:40 [notice] 1#1: using the "epoll" event method
2022/01/28 16:50:40 [notice] 1#1: nginx/1.21.6
2022/01/28 16:50:40 [notice] 1#1: built by gcc 10.3.1 20211027 (Alpine 10.3.1_git20211027)
2022/01/28 16:50:40 [notice] 1#1: OS: Linux 5.10.76-linuxkit
2022/01/28 16:50:40 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2022/01/28 16:50:40 [notice] 1#1: start worker processes
2022/01/28 16:50:40 [notice] 1#1: start worker process 34
2022/01/28 16:50:40 [notice] 1#1: start worker process 35
172.17.0.1 -- [28/Jan/2022:16:51:32 +0000] "GET / HTTP/1.1" 200 2703 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like G
ecko) Chrome/97.0.4692.99 Safari/537.36" "-"
172.17.0.1 -- [28/Jan/2022:16:51:33 +0000] "GET /assets/bootstrap/css/bootstrap.min.css HTTP/1.1" 200 162675 "http://localhost:5001/" "Mozilla/5.0 (Macinto
sh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/97.0.4692.99 Safari/537.36" "-"
```

(4) CONTAINER SERVICE EXPOSURE :



(5) DOCKER LOGS :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ docker logs a6be4df56fcb
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2022/01/28 17:25:56 [notice] 1#1: using the "epoll" event method
2022/01/28 17:25:56 [notice] 1#1: nginx/1.21.6
2022/01/28 17:25:56 [notice] 1#1: built by gcc 10.3.1 20211027 (Alpine 10.3.1_git20211027)
2022/01/28 17:25:56 [notice] 1#1: OS: Linux 5.10.76-linuxkit
2022/01/28 17:25:56 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2022/01/28 17:25:56 [notice] 1#1: start worker processes
2022/01/28 17:25:56 [notice] 1#1: start worker process 33
2022/01/28 17:25:56 [notice] 1#1: start worker process 34
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET / HTTP/1.1" 200 2703 "-" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET /assets/css/dh-row-text-image-right-responsive.css HTTP/1.1" 200 285 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET /assets/bootstrap/css/bootstrap.min.css HTTP/1.1" 200 162675 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET /assets/css/Navigation-with-Button.css HTTP/1.1" 200 2620 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET /assets/css/styles.css HTTP/1.1" 200 0 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET /assets/bootstrap/js/bootstrap.min.js HTTP/1.1" 200 78468 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:34 +0000] "GET /assets/img/office-front.jpeg HTTP/1.1" 200 44210 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
172.17.0.1 - - [28/Jun/2022:17:27:37 +0000] "GET /favicon.ico HTTP/1.1" 404 153 "http://localhost:5001/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/605.1.15 (KHTML, like Gecko) Version/15.0 Safari/605.1.15 "-"
2022/01/28 17:27:37 [error] 33#33: *6 open() "/usr/share/nginx/html/favicon.ico" failed (2: No such file or directory), client: 172.17.0.1, server: localhost, request: "GET /favicon.ico HTTP/1.1", host: "localhost:5001", referer: "http://localhost:5001/"
```

(6) EXECUTE INTO THE CONTAINERS :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ sudo docker exec -it a6be4df56fcb sh
Password:
/ # ls
bin          etc          mnt          run          tmp
dev          home        opt          sbin         usr
docker-entrypoint.d  lib        proc         srv          var
docker-entrypoint.sh media       root         sys
/ #
```

DEMONSTRATION OF THE KUBERNETES FEATURES :

(1) CREATE NAMESPACE :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl create -f deployment/docker-namespace.yml namespace/faf created
```

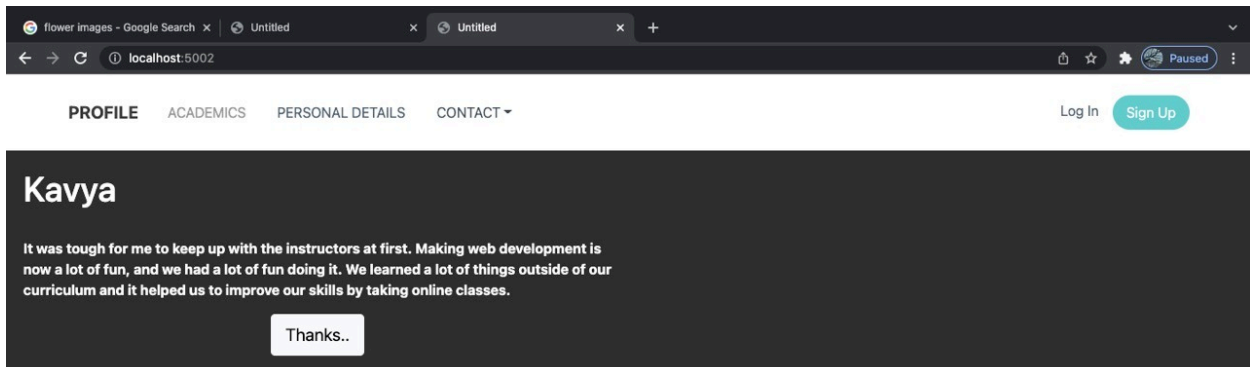
(2) DEPLOY THE POD IN THAT NAMESPACE :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl apply -f deployment/docker-deployment.yml deployment.apps/faf-deployment configured
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl get deployment -n faf
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
faf-deployment      2/2     2            2           21m
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl get pods -n faf
NAME                                     READY   STATUS    RESTARTS   AGE
faf-deployment-544f76fd9f-hzggc        1/1     Running   0           55s
faf-deployment-544f76fd9f-p5sl2        1/1     Running   0           58s
```

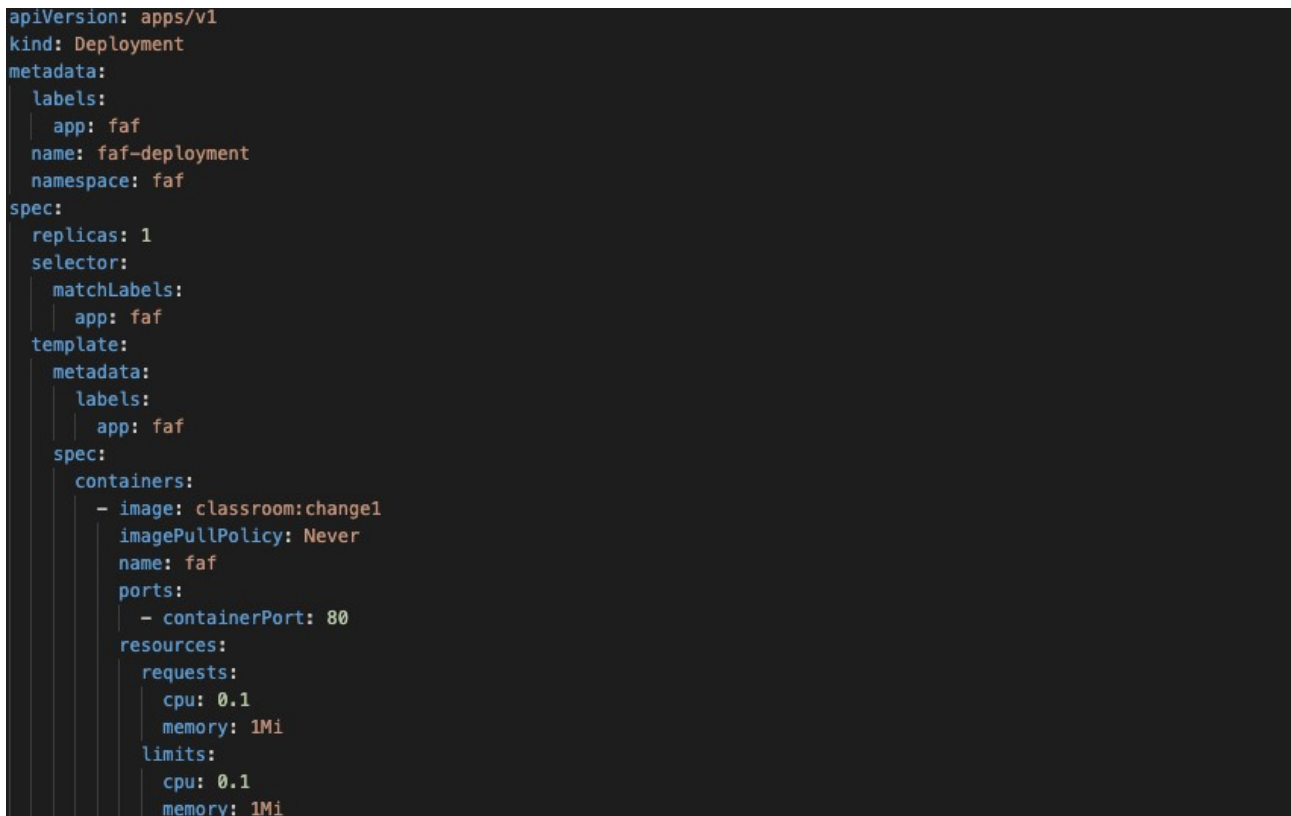
(3) SETTING THE REPLICA FACTOR :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl apply -f deployment/docker-deployment.yml deployment.apps/faf-deployment configured
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl get pods -n faf
NAME                                     READY   STATUS    RESTARTS   AGE
faf-deployment-544f76fd9f-p5sl2        1/1     Running   0           12m
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl apply -f deployment/docker-deployment.yml deployment.apps/faf-deployment configured
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl get pods -n faf
NAME                                     READY   STATUS    RESTARTS   AGE
faf-deployment-544f76fd9f-p5sl2        1/1     Running   0           12m
```

(4) EXPOSE SERVICE AND MAKE IT ACCESSIBLE BY THE OTHER PODS OR FROM THE EXTERNAL :



(5) SET THE RESOURCE LIMIT AND SHOW WHAT HAPPENS WHEN THE LIMIT REACHED, EXCEEDED :



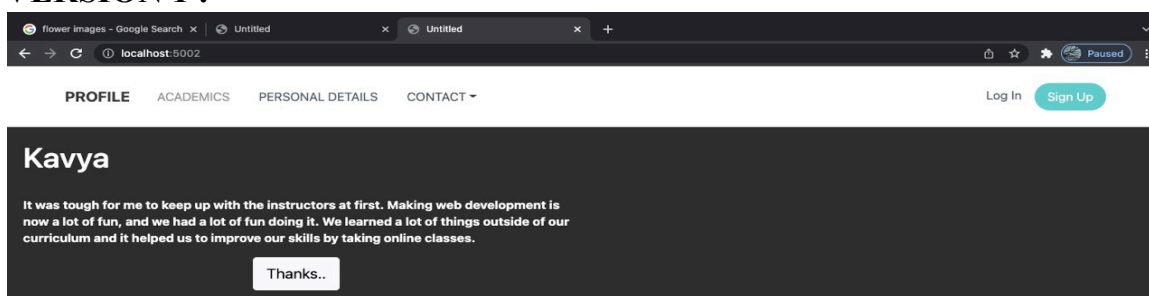

```

Events:
  Type            Reason            Age           From          Message
  ----            -
Normal    Scheduled         2m12s        default-scheduler   Successfully assigned faf/faf-deployment-59499f9945-x57sm to minikube
Warning   FailedCreatePodSandBox 119s (x4 over 2m11s) kubelet        Failed create pod sandbox: rpc error: code = Unknown desc = failed to start sandbox container f
or pod "faf-deployment-59499f9945-x57sm": Error response from daemon: OCI runtime create failed: container_linux.go:380: starting container process caused: container init w
as OOM-killed (memory limit too low?): unknown
Normal    SandboxChanged     118s (x12 over 2m18s) kubelet        Pod sandbox changed, it will be killed and re-created.
Warning   FailedCreatePodSandBox 117s (x9 over 2m9s) kubelet        Failed create pod sandbox: rpc error: code = Unknown desc = failed to start sandbox container f
or pod "faf-deployment-59499f9945-x57sm": Error response from daemon: OCI runtime create failed: container_linux.go:380: starting container process caused: process_linux.go
:393: copying bootstrap data to pipe caused: write init-p: broken pipe: unknown

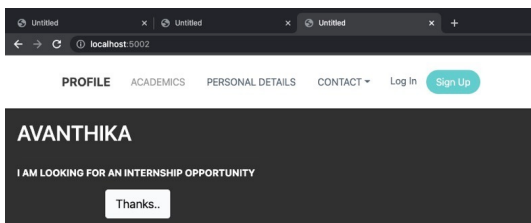
```

(6) TO MAKE CHANGES IN THE CODE AND DEPLOY IT AGAIN AND THE ROLLBACK STRATEGY :

VERSION 1 :



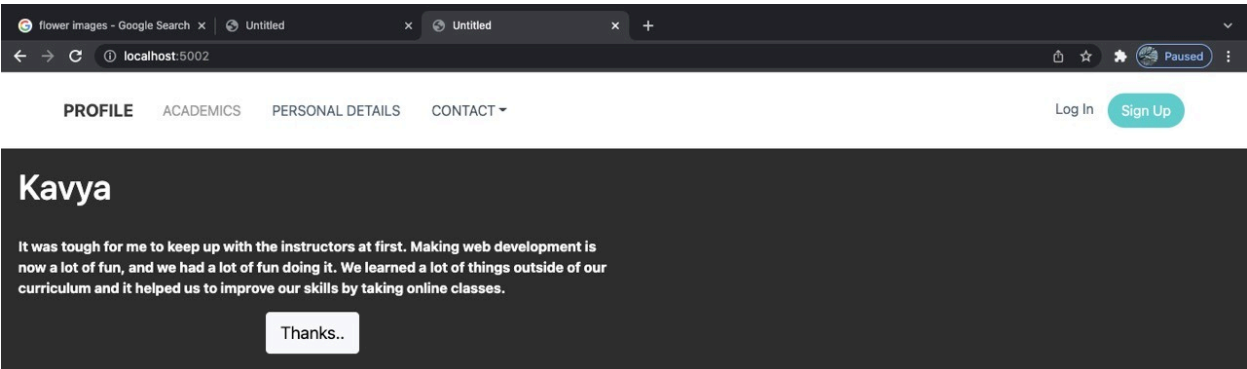
VERSION 2 :



ROLLOUT STRATEGY :

```
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl rollout history deploy faf-deployment -n faf
deployment.apps/faf-deployment
REVISION  CHANGE-CAUSE
1         <none>
2         <none>
3         <none>
5         <none>
6         <none>

(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl rollout undo deploy faf-deployment --to-revision=2 -n faf
deployment.apps/faf-deployment rolled back
(base) Vivekas-MacBook-Air:classroom Kavya$ kubectl get service -n faf
NAME          TYPE          CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
faf-service   LoadBalancer  10.108.67.235   <pending>        8080:30000/TCP   3h30m
```



(7)DESCRIPTION OF THE POD AND THE Deployment

node.kubernetes.io/unreachable:NoExecute op=Exists for 300s

Events:					
Type	Reason	Age	From	Message	
Normal	Scheduled	3m48s	default-scheduler	Successfully assigned faf/faf-deployment-648599699-26ftv to minikube	
Normal	Pulled	3m45s	kubelet	Container image "faf" already present on machine	
Normal	Created	3m45s	kubelet	Created container faf	
Normal	Started	3m45s	kubelet	Started container faf	

DEPLOYMENT EVENTS :

node.kubernetes.io/unreachable:NoExecute op=Exists for 300s				
Events:				
Type	Reason	Age	From	Message
----	-----	----	----	-----
Normal	Scheduled	3m48s	default-scheduler	Successfully assigned faf/faf-deployment-648599699-26ftv to minikube
Normal	Pulled	3m45s	kubelet	Container image "faf" already present on machine
Normal	Created	3m45s	kubelet	Created container faf
Normal	Started	3m45s	kubelet	Started container faf

Events:				
Type	Reason	Age	From	Message
----	-----	----	----	-----
Normal	ScalingReplicaSet	4m57s (x2 over 3h4m)	deployment-controller	Scaled up replica set faf-deployment-648599699 to 1
Normal	ScalingReplicaSet	4m57s (x2 over 155m)	deployment-controller	Scaled down replica set faf-deployment-545f99c795 to 0
Normal	ScalingReplicaSet	4m53s (x2 over 3h4m)	deployment-controller	Scaled up replica set faf-deployment-648599699 to 2
Normal	ScalingReplicaSet	4m53s	deployment-controller	Scaled down replica set faf-deployment-797d58667 to 1
Normal	ScalingReplicaSet	4m51s	deployment-controller	Scaled down replica set faf-deployment-797d58667 to 0

