

DOCKER REGISTRY – PRIVATE DOCKER REGISTRY

A **Docker Registry** is a storage and distribution system for Docker images. It allows you to store Docker images, manage versions, and share them across multiple environments or teams. Docker images are templates that define how a containerized application should be built and run. Docker Hub is the default public registry provided by Docker, but you can also use private registries for specific use cases.

Why Do We Need a Docker Registry?

1. **Centralized Storage:** It provides a centralized repository where Docker images can be stored and accessed easily, instead of keeping them on local machines.
2. **Version Control:** It helps manage different versions of Docker images, allowing users to pull specific versions based on tags.
3. **Image Sharing:** Docker registries enable sharing images with other developers, teams, or automated systems like CI/CD pipelines.
4. **Automation:** Registries are crucial for automating deployments, as images can be pulled directly from a registry in environments such as production, testing, or staging.

What is a Private Docker Registry?

A Private Docker Registry is a registry hosted in your own infrastructure or on a cloud platform where access is controlled. Unlike public registries like Docker Hub, a private registry ensures that only authorized users can push or pull Docker images.

Why Use a Private Docker Registry?

1. **Security:** Sensitive or proprietary Docker images can be stored securely without the risk of public exposure. Authentication and access control can limit who can access or modify the images.
2. **Custom Deployments:** For organizations with internal tools or services that don't need to be public, private registries ensure that images can only be accessed within the organization.
3. **Faster Access:** Private registries can be hosted closer to the production environment, reducing the latency in pulling images, which improves speed, especially for large teams or enterprises.

Creating the DOCKER REGISTRY on own infrastructure.

```
root@manoj:~#  
root@manoj:~#  
root@manoj:~# docker images  
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE  
nginx          latest    39286ab8a5e1   6 weeks ago    188MB  
busybox        latest    87ff76f62d36   16 months ago  4.26MB  
node           14        1d12470fa662   17 months ago  912MB  
root@manoj:~#  
root@manoj:~# # i want to add nginx image into my private registry where outside world can't access  
root@manoj:~# #let pull the docker registry  
root@manoj:~#  
root@manoj:~#  
root@manoj:~# docker pull registry  
Using default tag: latest  
latest: Pulling from library/registry  
1cc3d825d8b2: Pull complete  
85ab09421e5a: Pull complete  
40960af72c1c: Pull complete  
e7bb1dbb377e: Pull complete  
a538cc9b1ae3: Pull complete  
Digest: sha256:ac0192b549007e22998eb74e8d8488dcfe70f1489520c3b144a6047ac5efbe90  
Status: Downloaded newer image for registry:latest  
docker.io/library/registry:latest  
root@manoj:~#  
root@manoj:~#  
root@manoj:~# docker images  
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE  
nginx          latest    39286ab8a5e1   6 weeks ago    188MB  
registry        latest    75ef5b734af4   11 months ago  25.4MB  
busybox        latest    87ff76f62d36   16 months ago  4.26MB  
node           14        1d12470fa662   17 months ago  912MB  
root@manoj:~#
```

DOCKER REGISTRY – PRIVATE DOCKER REGISTRY

```
root@manoj:~# docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS        NAMES
root@manoj:~# #now let me start the container registry
root@manoj:~# docker run -itd --rm -p 5000:5000 --name registry-container registry
feb00010647041d38a49e2e96ea5245f436eb32e5a04

root@manoj:~# docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS        NAMES
5a3d8f0e4e4d   registry   "/entrypoint.sh /etc..." 6 seconds ago  Up 5 seconds  0.0.0.0:5000->5000/tcp, :::5000->5000/tcp  registry-container
```

creating the container for docker registry

registry-container

```
3.27.197.94:5000/v2/_catalog

{"repositories":[]}
```

we can see that private registry got created but we don't see any images in the registry. Now let me add push the images from my host system to registry

```
root@manoj:~# docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
nginx          latest    ab8a5e1       6 weeks ago   188MB
registry       latest    b734af4       11 months ago 25.4MB
busybox        latest    6f62d36       16 months ago 4.26MB
node          14        70fa662       17 months ago 912MB

root@manoj:~# # now i want to add the nginx into by docker-registry-private
root@manoj:~# docker tag nginx localhost:5000/nginx
root@manoj:~# docker push localhost:5000/nginx
Using default tag: latest
The push refers to repository [localhost:5000/nginx]
11de3d47036d: Pushed
16907864a2d0: Pushed
2bdf51597158: Pushed
9fc6bb94eec5: Pushed
eda13eb24d4c: Pushed
57796e30ff04: Pushing [=====>] 37.91MB/112.9MB
3e2ab394fabf: Pushing [=====>] 22.26MB/74.78MB
```

tag the image that you want to push into the registry

pushing the images into the docker registry

DOCKER REGISTRY – PRIVATE DOCKER REGISTRY

Instances | EC2 | ap-southeast-1 | Explore Docker's Container Images | 3.27.197.94:5000/v2/_catalog

Not secure 3.27.197.94:5000/v2/_catalog

```
["repositories":["nginx"]}]
```

Now we can see the image that we push from host is present inside the registry

Note: we didn't mount any volume to the container, if we delete the container data will be done, so let mount the volume and push the images

```
root@manoj:~# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
nginx                latest             39286ab1           6 weeks ago        188MB
localhost:5000/nginx latest             39286ab1           6 weeks ago        188MB
registry             latest             75ef5b7f           11 months ago      25.4MB
busybox              latest             87ff776f           16 months ago      4.26MB
node                 14                1d12476c           17 months ago      912MB
```

we can see the image, present in our private registry

```
root@manoj:~# docker rmi localhost:5000/nginx
Untagged: localhost:5000/nginx:latest
Untagged: localhost:5000/nginx@sha256:596c783ac62b9a43c60edb876fe807376cd5022a4e25e89b9a9ae06c374299d4
```

Deleted the image

```
root@manoj:~# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
nginx                latest             39286ab1           6 weeks ago        188MB
registry             latest             75ef5b7f           11 months ago      25.4MB
busybox              latest             87ff776f           16 months ago      4.26MB
node                 14                1d12476c           17 months ago      912MB
```

we can't see the image, now let me pull the image from my private registry

```
root@manoj:~# docker pull localhost:5000/nginx
Using default tag: latest
latest: Pulling from nginx
Digest: sha256:lac62b9a43c60edb876fe807376cd5022a4e25e89b9a9ae06c374299d4
Status: Downloaded newer image for localhost:5000/nginx:latest
localhost:5000/nginx:latest
```

pulling the image from private registry

```
root@manoj:~# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
localhost:5000/nginx latest             39286ab1           6 weeks ago        188MB
nginx                latest             39286ab1           6 weeks ago        188MB
registry             latest             75ef5b7f           11 months ago      25.4MB
busybox              latest             87ff776f           16 months ago      4.26MB
node                 14                1d12476c           17 months ago      912MB
```

we can see, I successfully pulled the image from my private registry

```
root@manoj:~# docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED    STATUS    PORTS                               NAMES
1             registry  "/entrypoint.sh /etc..." 24 minutes ago Up 24 minutes 0.0.0.0:5000->5000/tcp, :::5000->5000/tcp registry-container
```

Deleted the container, now let's check can we access the image present in private container

```
root@manoj:~# docker stop 1b06edde
1b06edde
root@manoj:~# docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED    STATUS    PORTS                               NAMES
1             registry  "/entrypoint.sh /etc..." 5 seconds ago Up 4 seconds 0.0.0.0:5000->5000/tcp, :::5000->5000/tcp registry-container-2
```

Created new container

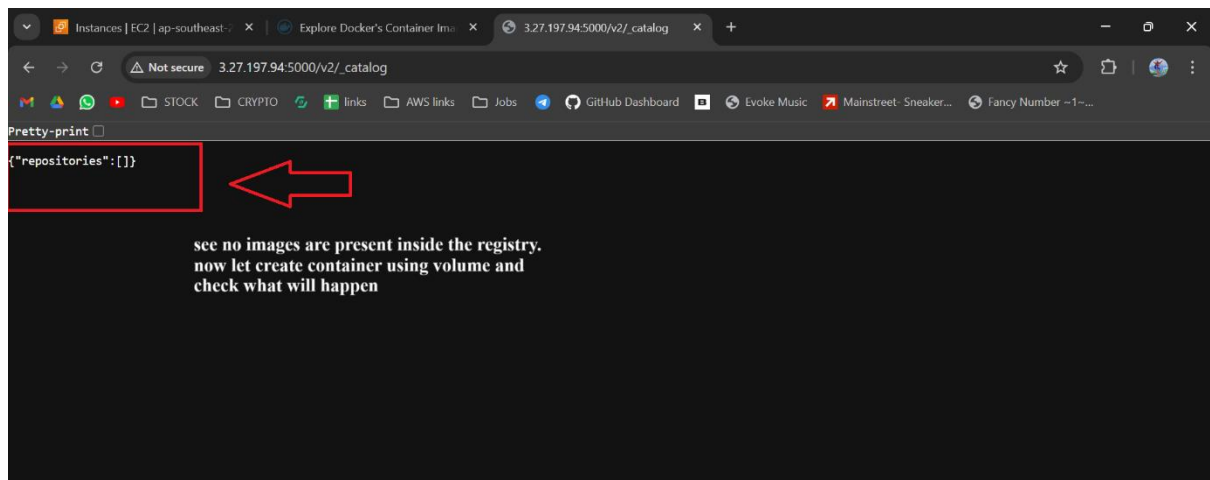
```
root@manoj:~# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
localhost:5000/nginx latest             39286ab1           6 weeks ago        188MB
nginx                latest             39286ab1           6 weeks ago        188MB
registry             latest             75ef5b7f           11 months ago      25.4MB
busybox              latest             87ff776f           16 months ago      4.26MB
node                 14                1d12476c           17 months ago      912MB
```

we still have the image that we created

DOCKER REGISTRY – PRIVATE DOCKER REGISTRY

```
root@manoj:~#
root@manoj:~# docker pull localhost:5000/nginx
Using default tag: latest
Error response from daemon: manifest for localhost:5000/nginx:latest not found: manifest unknown: manifest unknown
root@manoj:~#
```

we can see ERROR -- manifest not found, because when I created the container I didn't added any volume to the container. so when I deleted the container data also got deleted



see no images are present inside the registry.
now let create container using volume and
check what will happen

Creating Docker registry using volume, to store the docker images

```
root@manoj:~#
root@manoj:~# docker pull localhost:5000/nginx
Using default tag: latest
Error response from daemon: manifest for localhost:5000/nginx:latest not found: manifest unknown: manifest unknown
root@manoj:~#
root@manoj:~# docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS                               NAMES
5246d9c       registry   "/entrypoint.sh /etc..." 8 minutes ago  Up 8 minutes  0.0.0.0:5000->5000/tcp, :::5000->5000/tcp  registry-container-2
root@manoj:~#
root@manoj:~# docker stop 765c95246d9c
765c95246d9c
root@manoj:~#
root@manoj:~# ls
aws_demo_project  docker_compose_files  snap
root@manoj:~#
root@manoj:~# mkdir my-private-registry
root@manoj:~# ls
aws_demo_project  docker_compose_files  my-private-registry  snap
root@manoj:~#
root@manoj:~# docker run -itd --rm -p 5000:5000 -v /root/my-private-registry:/var/lib/registry --name registry-container registry
2c0b8b3ce20ed880f53ffb87682f7e071eb1bbce63475d6ca7
root@manoj:~#
root@manoj:~# docker ps
CONTAINER ID   IMAGE      COMMAND                  CREATED        STATUS        PORTS                               NAMES
1c0b8b3       registry   "/entrypoint.sh /etc..." 5 seconds ago  Up 5 seconds  0.0.0.0:5000->5000/tcp, :::5000->5000/tcp  registry-container
root@manoj:~#
```

created the bind mount volume

adding volume path to mount onto the container

```
root@manoj:~#
root@manoj:~#
root@manoj:~# docker images
REPOSITORY      TAG       IMAGE ID       CREATED        SIZE
nginx           latest   ab8a5e1       6 weeks ago   188MB
localhost:5000/nginx latest   ab8a5e1       6 weeks ago   188MB
registry        latest   0734af4       11 months ago 25.4MB
busybox         latest   5f62d36       16 months ago 4.26MB
node            14       70fa662       17 months ago 912MB
root@manoj:~#
root@manoj:~# docker push localhost:5000/nginx
Using default tag: latest
The push refers to repository [localhost:5000/nginx]
11de3d47036d: Pushed
16907864a2d0: Pushed
2bdf51597158: Pushed
0fc6bb94eec5: Pushed
eda13eb24d4c: Pushed
67796e30ff04: Pushing [=====>] 30.85MB/112.9MB
8e2ab394fabf: Pushing [====>] 5.41MB/74.78MB

```

pushing the images into the private registry

DOCKER REGISTRY – PRIVATE DOCKER REGISTRY

```
Instances | EC2 | ap-southeast-1 | Explore Docker's Container Im... | 3.27.197.94:5000/v2/_catalog | +
← → ↻ Not secure 3.27.197.94:5000/v2/_catalog ☆ 📄 🌐
Pretty-print [ ]
{"repositories":["nginx"]}
```

← we can see the image present in the private registry.

Now let me delete the container and see can we still access the data

```
root@manoj:~#
root@manoj:~#
root@manoj:~# ls
aws demo_project docker_compose_files my-private-registry snap
root@manoj:~#
root@manoj:~# cd my-private-registry
root@manoj:~/my-private-registry#
root@manoj:~/my-private-registry# ls
docker
root@manoj:~/my-private-registry# cd docker
root@manoj:~/my-private-registry/docker# ls
registry
root@manoj:~/my-private-registry/docker# cd registry
root@manoj:~/my-private-registry/docker/registry# ls
v2
root@manoj:~/my-private-registry/docker/registry# cd v2
root@manoj:~/my-private-registry/docker/registry/v2# ls
blobs repositories
root@manoj:~/my-private-registry/docker/registry/v2# cd repositories
root@manoj:~/my-private-registry/docker/registry/v2/repositories#
root@manoj:~/my-private-registry/docker/registry/v2/repositories# ls -ltr
total 4
drwxr-xr-x 5 root root 4096 Sep 26 07:39 nginx
root@manoj:~/my-private-registry/docker/registry/v2/repositories#
```

↓ we can see the data is added to the bind mount volume

```
root@manoj:~#
root@manoj:~# docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS                               NAMES
5e8872c0b8b3   registry "/entrypoint.sh /etc..." 9 minutes ago Up 9 minutes 0.0.0.0:5000->5000/tcp, :::5000->5000/tcp registry-container
```

Delete the container

```
root@manoj:~# docker stop 5e8872c0b8b3
root@manoj:~#
root@manoj:~# docker run -itd --rm -p 5000:5000 -v /root/my-private-registry:/var/lib/registry --name registry-container-3 registry
root@manoj:~#
root@manoj:~# docker exec -it registry-container-3 sh
/ #
/ # cd /var/lib/registry
/var/lib/registry # ls
docker
/var/lib/registry # cd docker
/var/lib/registry/docker # ls
registry
/var/lib/registry/docker # cd registry
/var/lib/registry/docker/registry # ls
v2
/var/lib/registry/docker/registry # cd v2
/var/lib/registry/docker/registry/v2 # ls
blobs repositories
/var/lib/registry/docker/registry/v2 # cd repositories
/var/lib/registry/docker/registry/v2/repositories # ls -ltr
total 4
drwxr-xr-x 5 root root 4096 Sep 26 07:39 nginx
/var/lib/registry/docker/registry/v2/repositories #
```

↑ creating new container and checking that can I still access the image from my private registry

← we can image is still present inside the new container

```
Instances | EC2 | ap-southeast-1 | Explore Docker's Container Im... | 3.27.197.94:5000/v2/_catalog | +
← → ↻ Not secure 3.27.197.94:5000/v2/_catalog ☆ 📄 🌐
Pretty-print [ ]
{"repositories":["nginx"]}
```

↑ image is still present inside my private- registry