

[Hands-on] 03. Docker commands

자주 사용되는 도커 명령어를 알아보겠습니다.

먼저 이미지를 모두 정리하고 시작할게요.

```
ubuntu@ip-10-0-1-14:~$ docker rmi --force $(docker images --all --quiet)
Untagged: nginx:latest
Untagged: nginx@sha256:10f14ffa93f8dedf1057897b745e5ac72ac5655c299dade0aa434c71557697ea
Deleted: sha256:55f4b40fe486a5b734b46bb7bf28f52fa31426bf23be068c8e7b19e58d9b8deb
Deleted: sha256:5f58fed9b4d8e6c09cdc42eed6de6df7a7e35b40d92c98f30f8ecad4960fb7a0
Deleted: sha256:8bb72c1d014292ebf1ae348a77624c536e766757356c6dbb0de75122a94b445d
Deleted: sha256:cc9ac0adbded956d924bcf6c26ffbc93ea070019be1437d204b530a033ff4b16
Deleted: sha256:30f210588f35917f0edb5a2465db7ad60e4ef3b6ac74fe155474e14e6f0995c5
Deleted: sha256:5ecd5431cf49a2a11115844de1e7b23b9535be8789add9ab50973867db5f7d36
Deleted: sha256:08249ce7456a1c0613eafe868aed936a284ed9f1d6144f7d2d08c514974a2af9
Untagged: busybox:latest
Untagged: busybox@sha256:3614ca5eacf0a3a1bcc361c939202a974b4902b9334ff36eb29ffe9011aaad83
Deleted: sha256:62aedd01bd8520c43d06b09f7a0f67ba9720bdc04631a8242c65ea995f3ecac8
Deleted: sha256:7ad00cd55506625f2afad262de6002c8cef20d214b353e51d1025e40e8646e18
```

명령어 : `docker rmi --force $(docker images --all --quiet)`

- `--force(-f)` 옵션은 강제로 삭제를 하는 옵션이니 주의해서 사용해야 합니다.

Docker & Kubernetes - [Hands-on] 03. Docker commands

도커 이미지를 검색하는 명령어는 docker search입니다.

도커허브에서 Ubuntu 이미지를 찾아볼까요?

NAME	DESCRIPTION	STARS	OFFICIAL	AUTOMATED
ubuntu	Ubuntu is a Debian-based Linux operating sys...	14486	[OK]	
websphere-liberty	WebSphere Liberty multi-architecture images ...	286	[OK]	
ubuntu-upstart	DEPRECATED, as is Upstart (find other proces...	112	[OK]	
neurodebian	NeuroDebian provides neuroscience research s...	91	[OK]	
open-liberty	Open Liberty multi-architecture images based...	53	[OK]	
ubuntu/nginx	Nginx, a high-performance reverse proxy & we...	52		
ubuntu-debootstrap	DEPRECATED; use "ubuntu" instead	46	[OK]	
ubuntu/apache2	Apache, a secure & extensible open-source HT...	36		
ubuntu/mysql	MySQL open source fast, stable, multi-thread...	34		
kasmweb/ubuntu-bionic-desktop	Ubuntu productivity desktop for Kasm Workspa...	29		
ubuntu/prometheus	Prometheus is a systems and service monitori...	27		
ubuntu/squid	Squid is a caching proxy for the Web. Long-t...	25		
ubuntu/bind9	BIND 9 is a very flexible, full-featured DNS...	21		
ubuntu/postgres	PostgreSQL is an open source object-relatio...	17		
ubuntu/redis	Redis, an open source key-value store. Long-...	10		
ubuntu/grafana	Grafana, a feature rich metrics dashboard & ...	6		
ubuntu/prometheus-alertmanager	Alertmanager handles client alerts from Prom...	6		
ubuntu/kafka	Apache Kafka, a distributed event streaming ...	6		
ubuntu/memcached	Memcached, in-memory keyvalue store for smal...	5		
ubuntu/telegraf	Telegraf collects, processes, aggregates & w...	4		
ubuntu/zookeeper	ZooKeeper maintains configuration informatio...	4		
ubuntu/cortex	Cortex provides storage for Prometheus. Long...	3		
ubuntu/cassandra	Cassandra, an open source NoSQL distributed ...	2		
bitnami/ubuntu-base-buildpack	Ubuntu base compilation image	2		[OK]
ubuntu/loki	Grafana Loki, a log aggregation system like ...	0		

명령어 : docker search ubuntu

Docker & Kubernetes - [Hands-on] 03. Docker commands

<https://hub.docker.com/> 에서도 한번 검색을 해보세요.

The screenshot shows the Docker Hub search interface with the query 'ubuntu' entered in the search bar. The results page displays five official Docker images related to Ubuntu:

- ubuntu** (DOCKER OFFICIAL IMAGE) - Updated 18 days ago. Description: Ubuntu is a Debian-based Linux operating system based on free software. Tags: Linux, IBM Z, 386, x86-64, ARM, ARM 64, PowerPC 64 LE, riscv64. Downloads: 1B+, Stars: 10K+.
- websphere-liberty** (DOCKER OFFICIAL IMAGE) - Updated 18 days ago. Description: WebSphere Liberty multi-architecture images based on Ubuntu 18.04. Tags: Linux, PowerPC 64 LE, IBM Z, x86-64, 386. Downloads: 10M+, Stars: 286.
- open-liberty** (DOCKER OFFICIAL IMAGE) - Updated 18 days ago. Description: Open Liberty multi-architecture images based on Ubuntu 18.04. Tags: Linux, x86-64, PowerPC 64 LE, IBM Z, 386. Downloads: 10M+, Stars: 53.
- ubuntu-debootstrap** (DOCKER OFFICIAL IMAGE) - Updated 6 years ago. Description: DEPRECATED; use "ubuntu" instead. Tags: None. Downloads: 5M+, Stars: 46.
- neurodebian** (DOCKER OFFICIAL IMAGE) - Updated 2 days ago. Description: NeuroDebian provides neuroscience research software for Debian, Ubuntu, and other derivatives. Tags: Linux, x86-64. Downloads: 5M+, Stars: 91.

On the left sidebar, there are filters for Images, Plugins, Trusted Content (Docker Official Image, Verified Publisher, Open Source Program), Operating Systems (Linux, Windows), and Architectures (ARM, ARM 64, IBM POWER, IBM Z, PowerPC 64 LE, x86, x86-64).

두 가지 결과가 어떤지 비교도 해보시구요.

Docker & Kubernetes - [Hands-on] 03. Docker commands

이제 ubuntu 이미지를 다운로드(pull) 해 보겠습니다.

```
ubuntu@ip-10-0-1-14:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
405f018f9d1d: Pull complete
Digest: sha256:b6b83d3c331794420340093eb706a6f152d9c1fa51b262d9bf34594887c2c7ac
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
```

| 명령어 : **docker pull ubuntu**

tag를 특정해서(18.04) 다운로드도 해보구요.

```
ubuntu@ip-10-0-1-14:~$ docker pull ubuntu:18.04
18.04: Pulling from library/ubuntu
09db6f815738: Pull complete
Digest: sha256:478caf1bec1afd54a58435ec681c8755883b7eb843a8630091890130b15a79af
Status: Downloaded newer image for ubuntu:18.04
docker.io/library/ubuntu:18.04
```

| 명령어 : **docker pull ubuntu:18.04**

Docker & Kubernetes - [Hands-on] 03. Docker commands

받아온 이미지를 확인해볼까요?

```
ubuntu@ip-10-0-1-14:~$ docker images
REPOSITORY      TAG          IMAGE ID       CREATED        SIZE
ubuntu          latest        27941809078c   2 weeks ago   77.8MB
ubuntu          18.04       ad080923604a   2 weeks ago   63.1MB
```

| 명령어 : docker images

tag를 명시하지 않은 경우는 default tag인 **latest**를 받아오네요.

이제 실행(run)을 해보겠습니다.

```
ubuntu@ip-10-0-1-14:~$ docker run --interactive --tty ubuntu /bin/bash
root@060b1a36d1e5:/#
```

| 명령어 : docker run --interactive --tty ubuntu /bin/bash

- **--interactive --tty**로 실행했기 때문에 ubuntu의 bash shell에 콘솔로 연결되었습니다. (프롬프트 확인!)

Docker & Kubernetes - [Hands-on] 03. Docker commands

실행된 ubuntu의 정보를 확인 해볼까요?

```
root@060b1a36d1e5:/# cat /etc/os-release
PRETTY_NAME="Ubuntu 22.04 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=jammy
```

명령어 : `cat /etc/os-release`

Ubuntu 22.04 LTS로 실행된 것을 확인할 수 있습니다. (실행한 시기에 따라 달라질 수 있습니다.)

이제 `exit` 명령어로 컨테이너를 빠져나오겠습니다.

```
root@060b1a36d1e5:/# exit
exit
ubuntu@ip-10-0-1-14:~$
```

명령어 : `exit`

Docker & Kubernetes - [Hands-on] 03. Docker commands

이번에는 `ubuntu:18.04`를 실행해봅시다.

```
ubuntu@ip-10-0-1-14:~$ docker run --interactive --tty ubuntu:18.04 /bin/bash  
root@31d0f5ae7f56:/#
```

명령어 : `docker run --interactive --tty ubuntu:18.04 /bin/bash`

종전과는 다르게 `tag(18.04)`를 명시해서 실행했습니다.

`cat /etc/os-release`의 결과는 어떻게 나올까요?

```
root@31d0f5ae7f56:/# cat /etc/os-release  
NAME="Ubuntu"  
VERSION="18.04.6 LTS (Bionic Beaver)"  
ID=ubuntu  
ID_LIKE=debian  
PRETTY_NAME="Ubuntu 18.04.6 LTS"  
VERSION_ID="18.04"  
HOME_URL="https://www.ubuntu.com/"  
SUPPORT_URL="https://help.ubuntu.com/"  
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"  
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"  
VERSION_CODENAME=bionic  
UBUNTU_CODENAME=bionic
```

명령어 : `cat /etc/os-release`

둘의 차이를 찾으셨나요? ☺_☺ (힌트 : VERSION)

Docker & Kubernetes - [Hands-on] 03. Docker commands

https://hub.docker.com/_/ubuntu 를 보시면, 어떤 tag가 latest인지 알 수 있습니다.

The screenshot shows the Docker Hub interface for the 'ubuntu' repository. At the top, there's a search bar with 'ubuntu' and navigation links for 'Explore', 'Pricing', 'Sign in', and 'Register'. Below the search bar, the repository name 'ubuntu' is displayed with a red star icon, indicating it's a Docker Official Image. A brief description follows: 'Ubuntu is a Debian-based Linux operating system based on free software.' To the right, there's a button labeled 'Copy and paste to pull this image' with the command 'docker pull ubuntu'. Below this are filter options for 'Architecture': '18+' (selected), 'Linux', 'IBM Z', '386', 'x86-64', 'ARM', 'ARM 64', 'PowerPC 64 LE', and 'Riscv64'. Underneath the filters, there are tabs for 'Description', 'Reviews', and 'Tags'. A modal window titled 'Get more out of Docker with a free Docker ID' is open, encouraging users to sign up for a Docker ID. The 'Tags' section lists various versions of Ubuntu, with '22.04', 'jammy-20220531', 'jammy', 'latest', and 'rolling' highlighted in a red box. Other tags listed include '20.04', 'focal-20220531', 'focal', '21.10', 'impish-20220531', 'impish', '22.10', 'kinetic-20220602', 'kinetic', 'devel', '14.04', 'trusty-20193217', 'trusty', and '16.04', 'xenial-20210804', 'xenial'.

이제 `exit` 명령어로 컨테이너에서 나와주세요.

```
root@31d0f5ae7f56:/# exit  
exit  
ubuntu@ip-10-0-1-14:~$
```

명령어 : `exit`

Docker & Kubernetes - [Hands-on] 03. Docker commands

이번엔 다른 방법(`--detach`)으로 실행해 보겠습니다.

```
ubuntu@ip-10-0-1-14:~$ docker run --detach --name my-nginx --publish 8080:80 nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
b85a868b505f: Pull complete
f4407ba1f103: Pull complete
4a7307612456: Pull complete
935cecace2a0: Pull complete
8f46223e4234: Pull complete
fe0ef4c895f5: Pull complete
Digest: sha256:10f14ffa93f8dedf1057897b745e5ac72ac5655c299dade0aa434c71557697ea
Status: Downloaded newer image for nginx:latest
f87853d90ac2305aa55945ea7babf3888ea5b13024046aead8968da2315b135b
ubuntu@ip-10-0-1-14:~$
```

명령어 : `docker run --detach --name my-nginx --publish 8080:80 nginx`

이전에 `--interactive` 옵션을 적용했을 때와는 달리, 프롬프트가 그대로 있네요.

이제 `docker ps --all` 명령어로 컨테이너 목록을 조회해보세요.

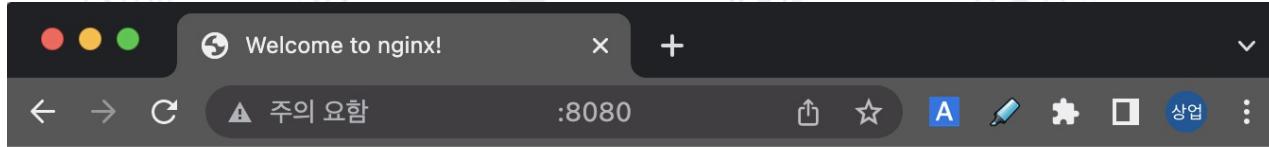
```
ubuntu@ip-10-0-1-14:~$ docker ps --all
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
f87853d90ac2 nginx "/docker-entrypoint..." About a minute ago Up About a minute 0.0.0.0:8080->80/tcp, :::8080->80/tcp my-nginx
31d0f5ae7f56 ubuntu:18.04 "/bin/bash" 14 minutes ago Exited (0) 3 minutes ago
060b1a36d1e5 ubuntu "/bin/bash" 25 minutes ago Exited (0) 25 minutes ago wonderful_bassi
determined_mahavira
```

이전에 실행했던 `ubuntu`와 `nginx`가 보일 거예요.

`ubuntu`는 `Exited` 상태이고, `nginx`는 `Running` 상태입니다.

nginx가 정말 Running 상태인지 8080번 포트로 접속해서 확인도 해보세요.

- AWS EC2인 경우 인스턴스의 Public IPv4 address로 접속하면 됩니다. (e.g. <http://IP:8080/>)
- Security group의 Inbound rule에 8080번 포트에 대한 규칙이 있어야 합니다.



Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

Docker & Kubernetes - [Hands-on] 03. Docker commands

이번엔 `docker stop` 명령어로 nginx 컨테이너를 멈춰봅시다.

```
ubuntu@ip-10-0-1-14:~$ docker stop $(docker ps --filter "name=my-nginx" --quiet)  
f87853d90ac2
```

명령어 : `docker stop $(docker ps --filter "name=my-nginx" --quiet)`

`docker ps --all`로 상태도 확인해보시고, 8080번 포트로 접속이 되는지 확인도 해보세요.

```
ubuntu@ip-10-0-1-14:~$ docker ps --all  
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES  
f87853d90ac2 nginx "/docker-entrypoint..." 13 minutes ago Exited (0) About a minute ago my-nginx  
31d0f5ae7f56 ubuntu:18.04 "/bin/bash" 26 minutes ago Exited (0) 15 minutes ago wonderful_bassi  
060b1a36d1e5 ubuntu "/bin/bash" 37 minutes ago Exited (0) 37 minutes ago determined_mahavira
```

명령어 : `docker ps --all`

- Exited 상태인 컨테이너는 `--all` 옵션을 적용해야 조회가 됩니다.

`docker start` 와 `docker restart` 는 직접 명령어를 만들어서 한번 해보세요.

Docker & Kubernetes - [Hands-on] 03. Docker commands

이제 도커 레지스트리에 대해 알아보고, 우리가 만든 애플리케이션을 등록해 보겠습니다.

먼저 <https://hub.docker.com/>에서 Repository를 하나 생성합니다.

로그인 후 Create Repository 버튼을 클릭해서 시작하면 됩니다.

이름은 101-todo-app 으로 할게요.

The screenshot shows the Docker Hub interface for creating a new repository. At the top, there's a search bar and navigation links for Explore, Repositories, Organizations, and Get Help. The user 'rogallo' is logged in. Below the header, it says 'Using 1 of 1 private repositories.' A 'Pro tip' box contains CLI commands for tagging and pushing images. The main form for creating a repository has fields for the repository name ('101-todo-app') and a description, both currently empty. Under 'Visibility', the 'Public' option is selected, with a note that public repositories appear in search results. The 'Private' option is also shown with a note that only the owner can view it.

이제 여러분의 Docker repository가 생겼습니다.

Docker & Kubernetes - [Hands-on] 03. Docker commands

샘플 애플리케이션 이미지를 다시 만들어 볼까요?

첫 번째 실습(Docker intro)을 떠올려보세요.

먼저 소스코드를 Github에서 clone 합니다.

```
ubuntu@ip-10-0-1-14:~$ git clone https://github.com/JungSangup/todo_list_manager.git app
Cloning into 'app'...
remote: Enumerating objects: 52, done.
remote: Counting objects: 100% (52/52), done.
remote: Compressing objects: 100% (49/49), done.
remote: Total 52 (delta 2), reused 52 (delta 2), pack-reused 0
Receiving objects: 100% (52/52), 1.67 MiB | 4.59 MiB/s, done.
Resolving deltas: 100% (2/2), done.
```

명령어 : `git clone https://github.com/JungSangup/todo_list_manager.git app`

그리고, 소스코드가 있는 경로로 이동해서

```
ubuntu@ip-10-0-1-14:~$ cd app
ubuntu@ip-10-0-1-14:~/app$
```

명령어 : `cd app`

Docker & Kubernetes - [Hands-on] 03. Docker commands

Dockerfile을 이용해서 이미지를 만듭니다. (`docker build` 명령어를 이용합니다.)

```
ubuntu@ip-10-0-1-14:~/app$ docker build --tag docker-101 .
Sending build context to Docker daemon 6.474MB
Step 1/5 : FROM node:10-alpine
10-alpine: Pulling from library/node
ddad3d7c1e96: Pull complete
de915e575d22: Pull complete
7150aa69525b: Pull complete
d7aa47be044e: Pull complete
Digest: sha256:dc98dac24efd4254f75976c40bce46944697a110d06ce7fa47e7268470cf2e28
Status: Downloaded newer image for node:10-alpine
--> aa67ba258e18
Step 2/5 : WORKDIR /app
--> Running in ba1fc555a405
Removing intermediate container ba1fc555a405
--> e264c24f5921
Step 3/5 : COPY .
--> 035ecc324928
Step 4/5 : RUN yarn install --production
--> Running in e404f12cb8f4
yarn install v1.22.5
[1/4] Resolving packages...
[2/4] Fetching packages...
info fsevents@1.2.9: The platform "linux" is incompatible with this module.
info "fsevents@1.2.9" is an optional dependency and failed compatibility check. Excluding it from installation.
[3/4] Linking dependencies...
[4/4] Building fresh packages...
Done in 10.35s.
```

Docker & Kubernetes - [Hands-on] 03. Docker commands

```
Removing intermediate container e404f12cb8f4
--> 463b7f0fb593
Step 5/5 : CMD [ "node", "/app/src/index.js" ]
--> Running in 74b0d190ca4a
Removing intermediate container 74b0d190ca4a
--> 096cfe46290d
Successfully built 096cfe46290d
Successfully tagged docker-101:latest
```

명령어 : `docker build --tag docker-101 .`

그리고, 마지막으로 만들어진 이미지를 확인합니다.
잘 만들어져 있나요?

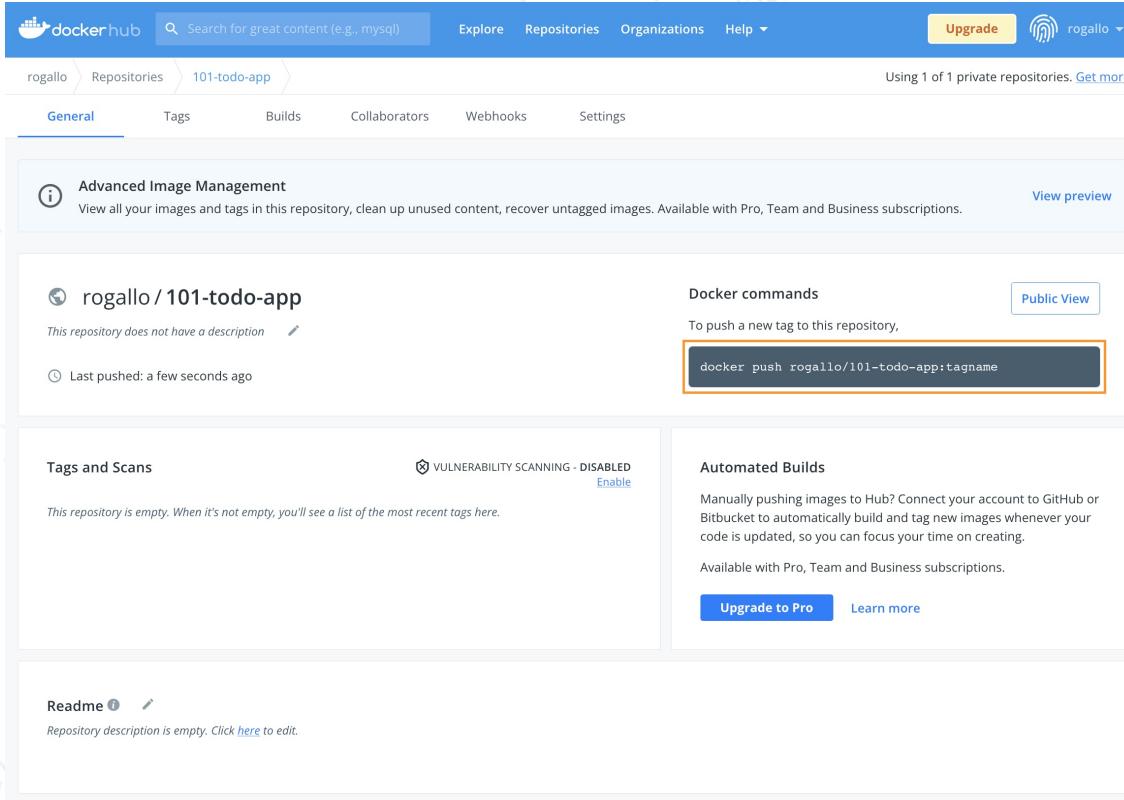
```
ubuntu@ip-10-0-1-14:~/app$ docker images docker-101
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
docker-101      latest   096cfe46290d   26 seconds ago   172MB
```

명령어 : `docker images docker-101`

Docker & Kubernetes - [Hands-on] 03. Docker commands

이제 우리가 만든 이미지를 우리의 Docker hub repository에 업로드(push)해 보겠습니다.

여러분의 Repository 를 보면 push 명령어가 표시되어 있습니다. (e.g. docker push rogallo/101-todo-app:tagname)



The screenshot shows the Docker Hub interface for a private repository named 'rogallo/101-todo-app'. The 'General' tab is selected. In the 'Docker commands' section, there is a button with the text 'docker push rogallo/101-todo-app:tagname'. This button is highlighted with a red rectangular box.

그대로 실행하면 안될거예요.

아직은 우리의 Host 머신에 우리 repository를 위한 이미지가 없기 때문입니다.

Docker & Kubernetes - [Hands-on] 03. Docker commands

아래 명령어로 필요한 이미지를 만들어 줍니다.

현재 있는 이미지를 이용해서 도커 허브에 올리기 위한 새로운 이미지를 만들어 줍니다. (REPOSITORY와 TAG 정보를 변경해서)

```
ubuntu@ip-10-0-1-14:~/app$ docker tag docker-101 rogallo/101-todo-app:1.0.0
```

명령어 : `docker tag docker-101 [USER-NAME]/101-todo-app:1.0.0`

[USER-NAME] 에는 여러분의 정보로 채워넣어 주세요.

이제 다시 로컬 registry의 image를 조회해보면,

```
ubuntu@ip-10-0-1-14:~/app$ docker images
REPOSITORY          TAG      IMAGE ID   CREATED    SIZE
docker-101          latest   096cf46290d  59 minutes ago  172MB
rogallo/101-todo-app 1.0.0   096cf46290d  59 minutes ago  172MB
```

명령어 : `docker images`

이제 준비가 됐습니다.

Docker & Kubernetes - [Hands-on] 03. Docker commands

먼저 로그인을 하구요,

```
ubuntu@ip-10-0-1-14:~/app$ docker login -u rogallo
Password:
WARNING! Your password will be stored unencrypted in /home/ubuntu/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
```

명령어 : `docker login -u [USER-NAME]`
[USER-NAME]에는 여러분의 정보로 채워넣어 주세요.

아래 명령어로 docker hub의 우리 repository에 업로드(push) 해볼까요?

```
ubuntu@ip-10-0-1-14:~/app$ docker push rogallo/101-todo-app:1.0.0
The push refers to repository [docker.io/rogallo/101-todo-app]
1b433114c90c: Pushed
53f2ecccc84e: Pushed
8b231c66a1d7: Pushed
edff9ff691d5: Mounted from library/node
cbe4b9146f86: Mounted from library/node
a6524c5b12a6: Mounted from library/node
9a5d14f9f550: Mounted from library/node
1.0.0: digest: sha256:18e19953a27c5575840214c7a8d0a3acbcd78bf695d7c8884f4c401939de8913 size: 1787
```

명령어 : `docker push [USER-NAME]/101-todo-app:1.0.0`
[USER-NAME]에는 여러분의 정보로 채워넣어 주세요.

Docker & Kubernetes - [Hands-on] 03. Docker commands

<https://hub.docker.com/> 에 방금 push한 이미지가 잘 올라가 있나요?

The screenshot shows the Docker Hub interface for a private repository named 'rogallo/101-todo-app'. The repository has one tag, '1.0.0', which was pushed a minute ago. The 'Docker commands' section contains the command 'docker push rogallo/101-todo-app:tagname'. Other sections include 'Tags and Scans' (disabled), 'Automated Builds' (disabled), and a 'Readme' section which is currently empty.

축하합니다. (≧▽≦)

이제 여러분이 만든 도커 이미지를 저장할 수 있는 공간이 생겼습니다.

언제 어디서든 방금 올려두신 이미지를 이용해서 여러분의 샘플 애플리케이션을 실행해보실 수 있게 됐습니다.

이번 실습은 여기까지입니다.