

[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:cc9ac0adbdd956d924bcf6c26ffbc93ea070019be1437d204b530a033ff4b16
Deleted: sha256:30f210588f35917f0edb5a2465db7ad60e4ef3b6ac74fe155474e14e6f0995c5
Deleted: sha256:5ecd5431cf49a2a1115844de1e7b23b9535be8789add9ab50973867db5f7d36
Deleted: sha256:08249ce7456a1c0613eafe868aed936a284ed9f1d6144f7d2d08c514974a2af9
Untagged: busybox:latest
Untagged: busybox@sha256:3614ca5eacf0a3a1bcc361c939202a974b4902b9334ff36eb29ffe9011aad83
Deleted: sha256:62aedd01bd8520c43d06b09f7a0f67ba9720bdc04631a8242c65ea995f3ecac8
Deleted: sha256:7ad0cd55506625f2afad262de6002c8cef20d214b353e51d1025e40e8646e18
```

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

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

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도커이미지를 검색하는 명령어는 `docker search`입니다.
도커허브에서 Ubuntu 이미지를 찾아볼까요?

```
ubuntu@ip-10-0-1-14:~$ docker search ubuntu
```

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`

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

The screenshot shows the Docker Hub search results for the query 'ubuntu'. The interface includes a search bar at the top with 'ubuntu' entered, and navigation links for 'Explore', 'Pricing', 'Sign In', and 'Register'. On the left, there are filters for 'Products' (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). The main content area displays a list of search results, sorted by 'Best Match'. The results include:

- ubuntu** (DOCKER OFFICIAL IMAGE): Updated 18 days ago. 1B+ Downloads, 10K+ Stars. Description: Ubuntu is a Debian-based Linux operating system based on free software. Architectures: Linux, IBM Z, 386, x86-64, ARM, ARM 64, PowerPC 64 LE, riscv64.
- websphere-liberty** (DOCKER OFFICIAL IMAGE): Updated 18 days ago. 10M+ Downloads, 286 Stars. Description: WebSphere Liberty multi-architecture images based on Ubuntu 18.04. Architectures: Linux, PowerPC 64 LE, IBM Z, x86-64, 386.
- open-liberty** (DOCKER OFFICIAL IMAGE): Updated 18 days ago. 10M+ Downloads, 53 Stars. Description: Open Liberty multi-architecture images based on Ubuntu 18.04. Architectures: Linux, x86-64, PowerPC 64 LE, IBM Z, 386.
- ubuntu-debootstrap** (DOCKER OFFICIAL IMAGE): Updated 6 years ago. 5M+ Downloads, 46 Stars. Description: DEPRECATED; use "ubuntu" instead.
- neurodebian** (DOCKER OFFICIAL IMAGE): Updated 2 days ago. 5M+ Downloads, 91 Stars. Description: NeuroDebian provides neuroscience research software for Debian, Ubuntu, and other derivatives. Architectures: Linux, x86-64.

두 가지 결과가 어떤지 비교도 해보시구요.

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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`

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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!)

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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`

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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`

좀전과는 다르게 `tag(18.04)` 를 명시해서 실행했습니다.

`cat /etc/os-release` 의 결과는 어떻게 나올까요?

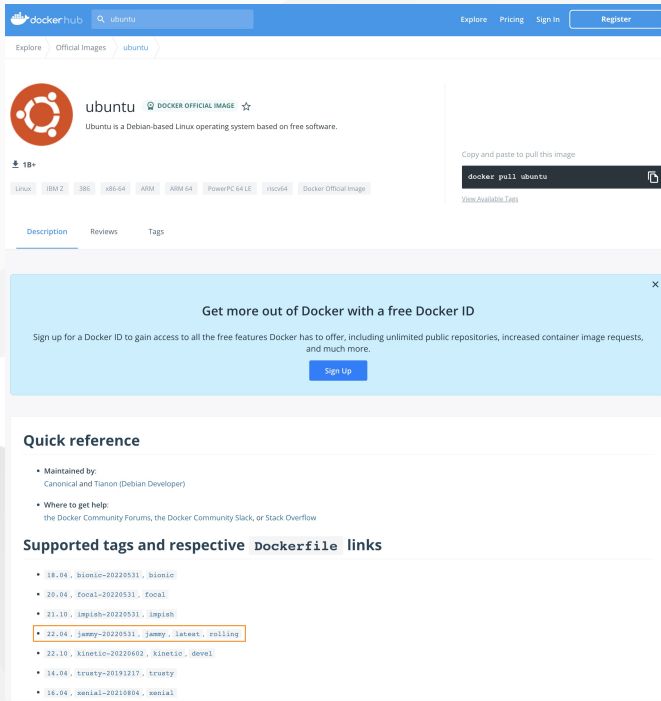
```
root@31d0f5ae7f56:/# cat /etc/os-release
NAME="Ubuntu"
VERSION="18.04.6 LTS (Bionic Beaver)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 18.04.6 LTS"
VERSION_ID="18.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-polic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

명령어 : `cat /etc/os-release`

둘의 차이를 찾으셨나요? ㅎㅎ (힌트 : VERSION)

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



이제 `exit` 명령어로 컨테이너에서 나와주세요.

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

명령어 : `exit`

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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
f87853d90ac2305aa55945ea7babf3888ea5b13024046aeadd8968da2315b135b
ubuntu@ip-10-0-1-14:~$
```

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

이전에 `--interactive` 옵션을 적용했을때와는 달리, 프롬프트가 그대로 있네요.

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

```
ubuntu@ip-10-0-1-14:~$ docker ps --all
```

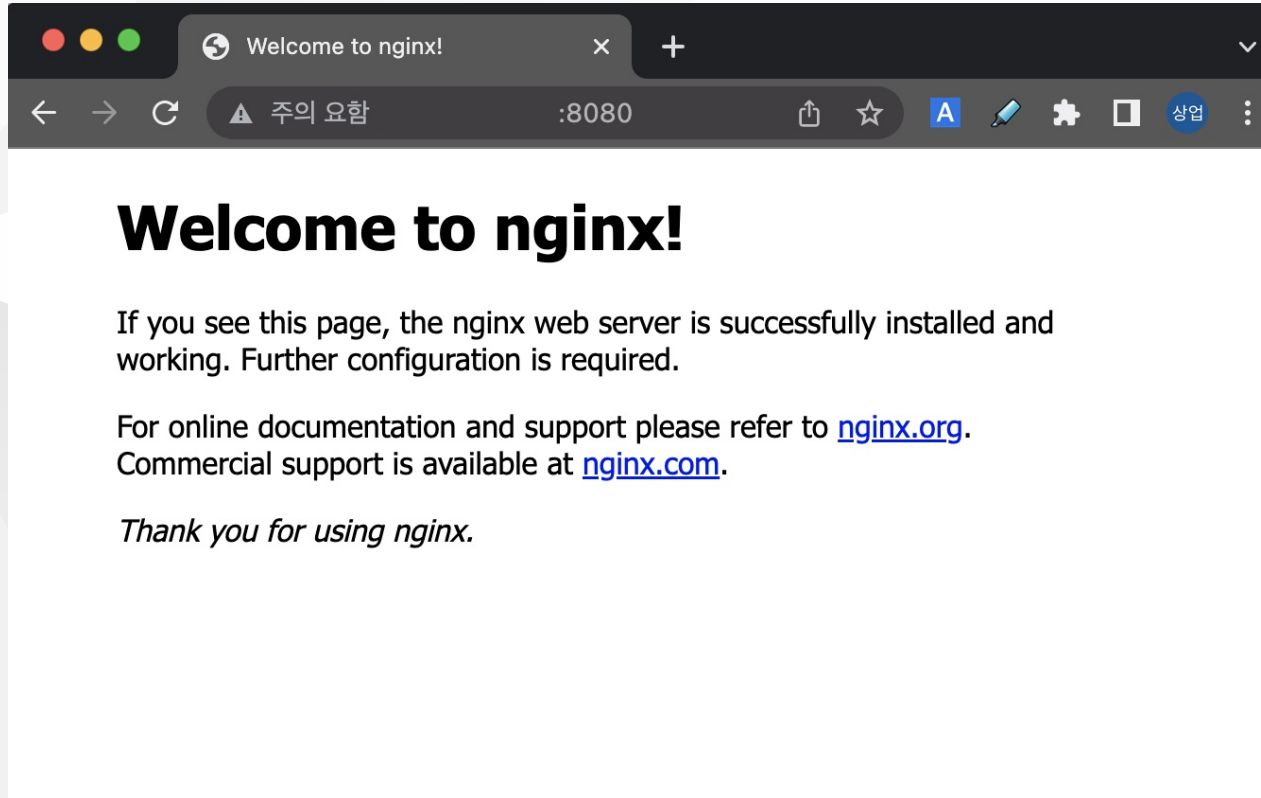
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
f87853d90ac2	nginx	"/docker-entrypoint..."	About a minute ago	Up About a minute	0.0.0.0:8080->80/tcp, :::8080->80/tcp	my-nginx
31d0f5ae7f56	ubuntu:18.04	"/bin/bash"	14 minutes ago	Exited (0) 3 minutes ago		wonderful_bassi
060b1a36d1e5	ubuntu	"/bin/bash"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

이전에 실행했던 ubuntu와 nginx가 보일거예요.
ubuntu는 Exited 상태이고, nginx는 Running 상태 입니다.

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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.



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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.

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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 'Create Repository' page. The top navigation bar includes the Docker Hub logo, a search bar, and links for Explore, Repositories, Organizations, Get Help, and a user profile for 'rogallo'. The main content area is titled 'Create Repository' and includes a form with the following fields:

- Username:** A dropdown menu showing 'rogallo'.
- Repository Name:** A text input field containing '101-todo-app'.
- Description:** A text input field.
- Visibility:** Two radio buttons: 'Public' (selected) and 'Private'.

Below the visibility options, there is a note: 'Using 1 of 1 private repositories. [Get more](#)'. The 'Public' option is selected, with a description: 'Public repositories appear in Docker Hub search results'. The 'Private' option is unselected, with a description: 'Only you can view private repositories'.

On the right side of the page, there is a 'Pro tip' section with the following text: 'You can push a new image to this repository using the CLI'. Below this, there is a code block with the following commands:

```
docker tag local-image:tagname new-repo:tagname
docker push new-repo:tagname
```

Below the code block, there is a note: 'Make sure to change *tagname* with your desired image repository tag.'

이제 여러분의 Docker repository가 생겼습니다.

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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`

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`Dockerfile`을 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.
```

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```
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?

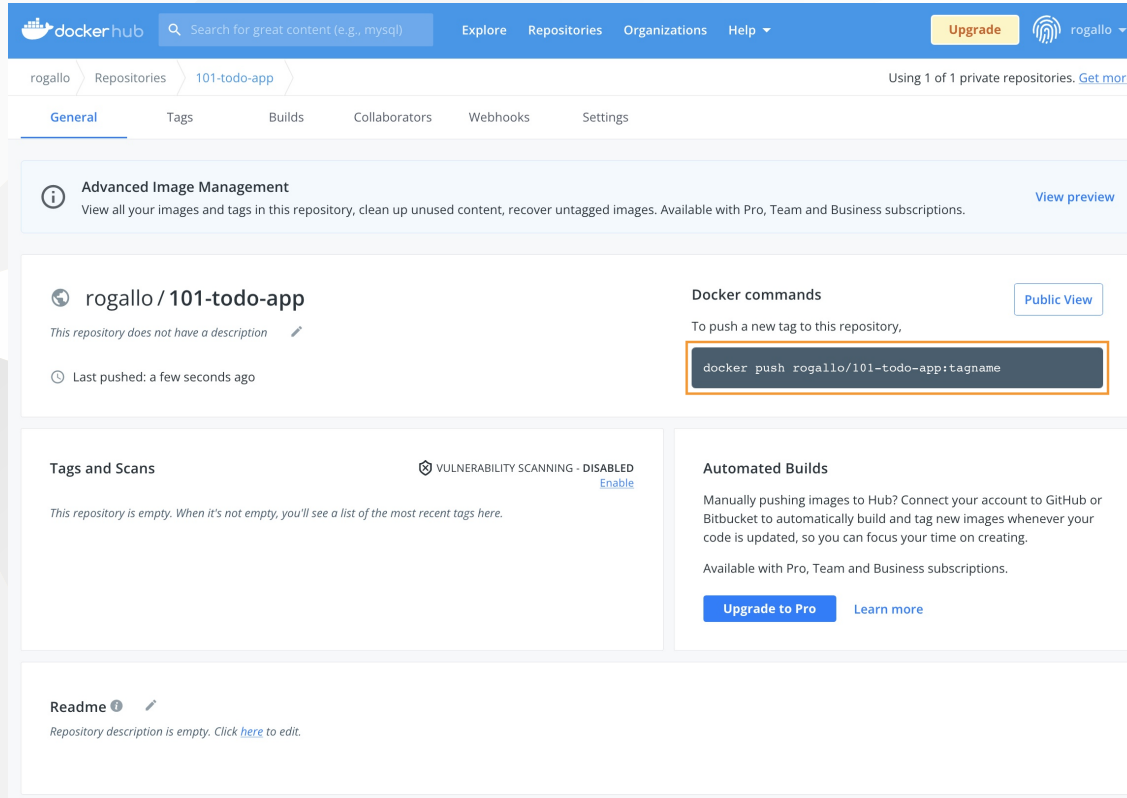
```
ubuntu@ip-10-0-1-14:~/app$ docker images docker-101
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
docker-101    latest    096cfe46290d   26 seconds ago 172MB
```

명령어 : `docker images docker-101`

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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`)



그대로 실행하면 안될거예요.

아직은 우리의 Host 머신에 우리 repository를 위한 이미지가 없기 때문입니다.

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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         096cfe46290d   59 minutes ago 172MB
rogallo/101-todo-app 1.0.0         096cfe46290d   59 minutes ago 172MB
```

명령어 : `docker images`

이제 준비가 됐습니다.

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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?

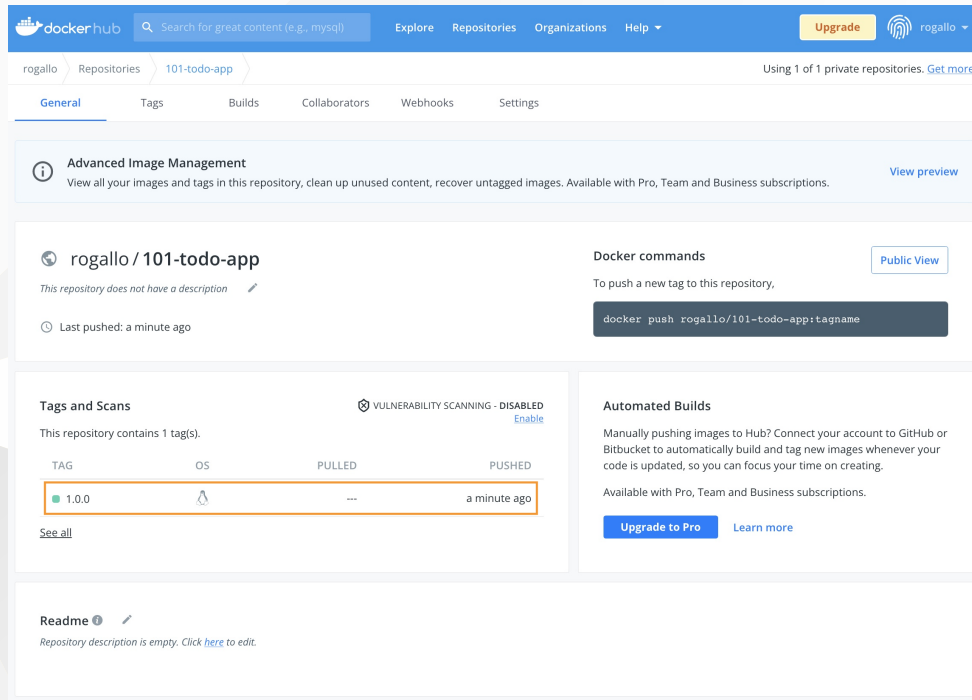
```
ubuntu@ip-10-0-1-14:~/app$ docker push rogallo/101-todo-app:1.0.0
The push refers to repository [docker.io/rogallo/101-todo-app]
1b433114c90c: Pushed
53f2ecccc84e: Pushed
8b231c66a1d7: Pushed
edff9ff691d5: Mounted from library/node
cbe4b9146f86: Mounted from library/node
a6524c5b12a6: Mounted from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



축하합니다. (๑>๓<๑)

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 여기까지 입니다.