DOCKER 기초

1. Introduction

Byun Kyuhyun

Working at a Startup

CircleCI Korea User Group Organizer
AWSKRUG Serverless Group Organizer

Interested in...

- DevOps
- Serverless
- Container
- AWS
- Well architected service
- Node.js
- Golang

bit.ly/docker-for-ai

개요

시작하기에 전에...

Docker를 알아야 하는 이유가 무엇이 있을까요?

2. Docker 란?

Docker is Platform

What is “Platform”?

Platform

Abstracts away a messy problem so you can build on top of it.

- Sam Ghods, Co-Founder at Box

https://www.youtube.com/watch?v=of45hYbkIZs&feature=youtu.be

2. Docker 란?

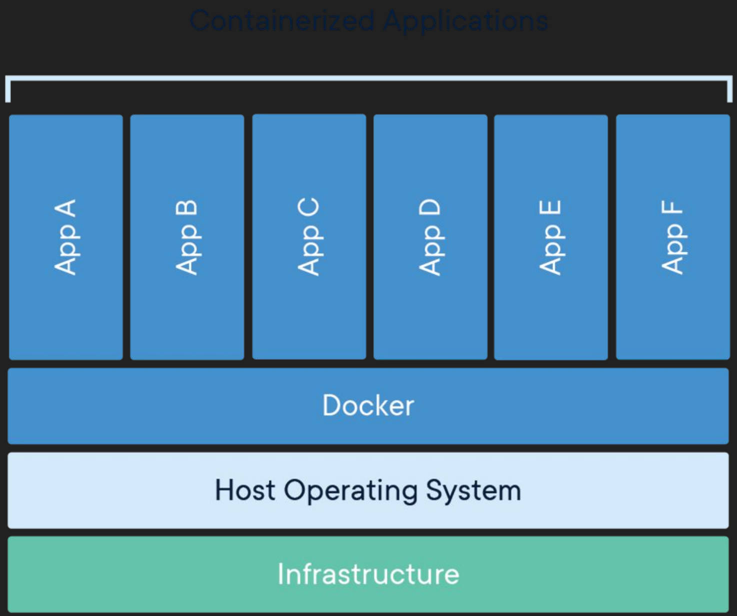
Docker 를 시작하기 전에 간단하게 알아두어야 할 것.

- Linux
- Virtual Machine
- Hipervisor
- Kernel

2. Docker 란?

What is Container?

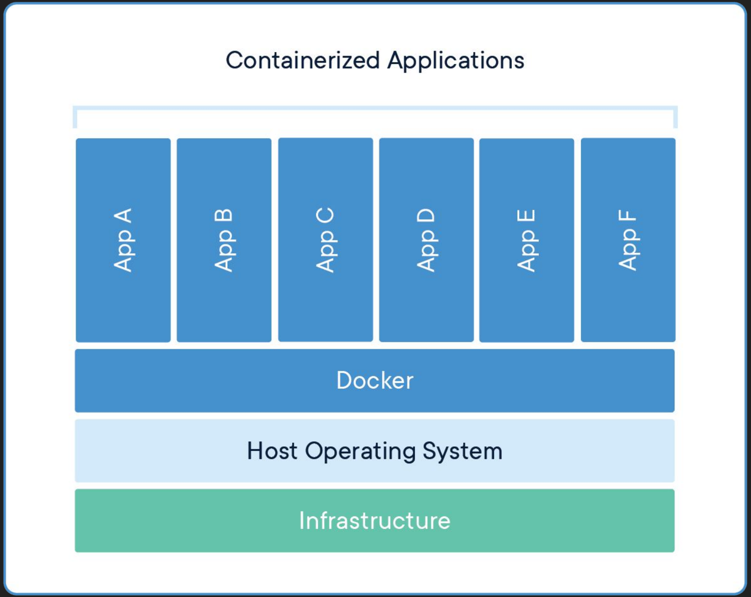
- Package Software into Standardized Units for Development, Shipment and Deployment

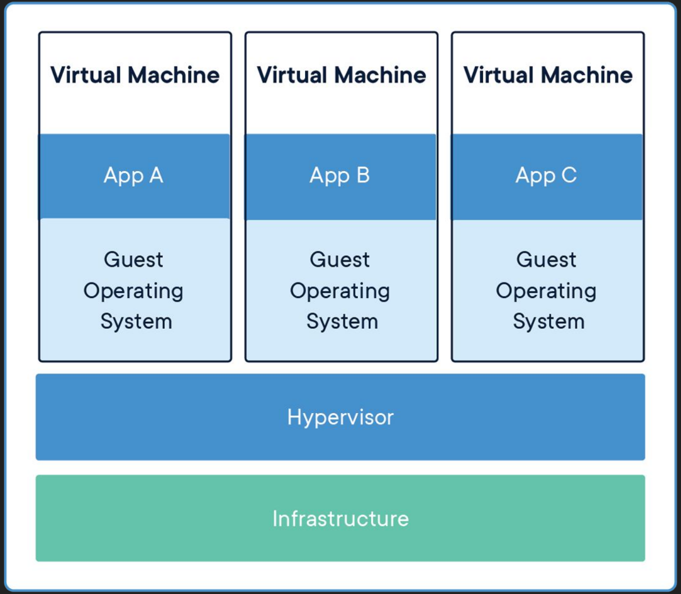


https://www.docker.com/resources/what-container

2. Docker 란?

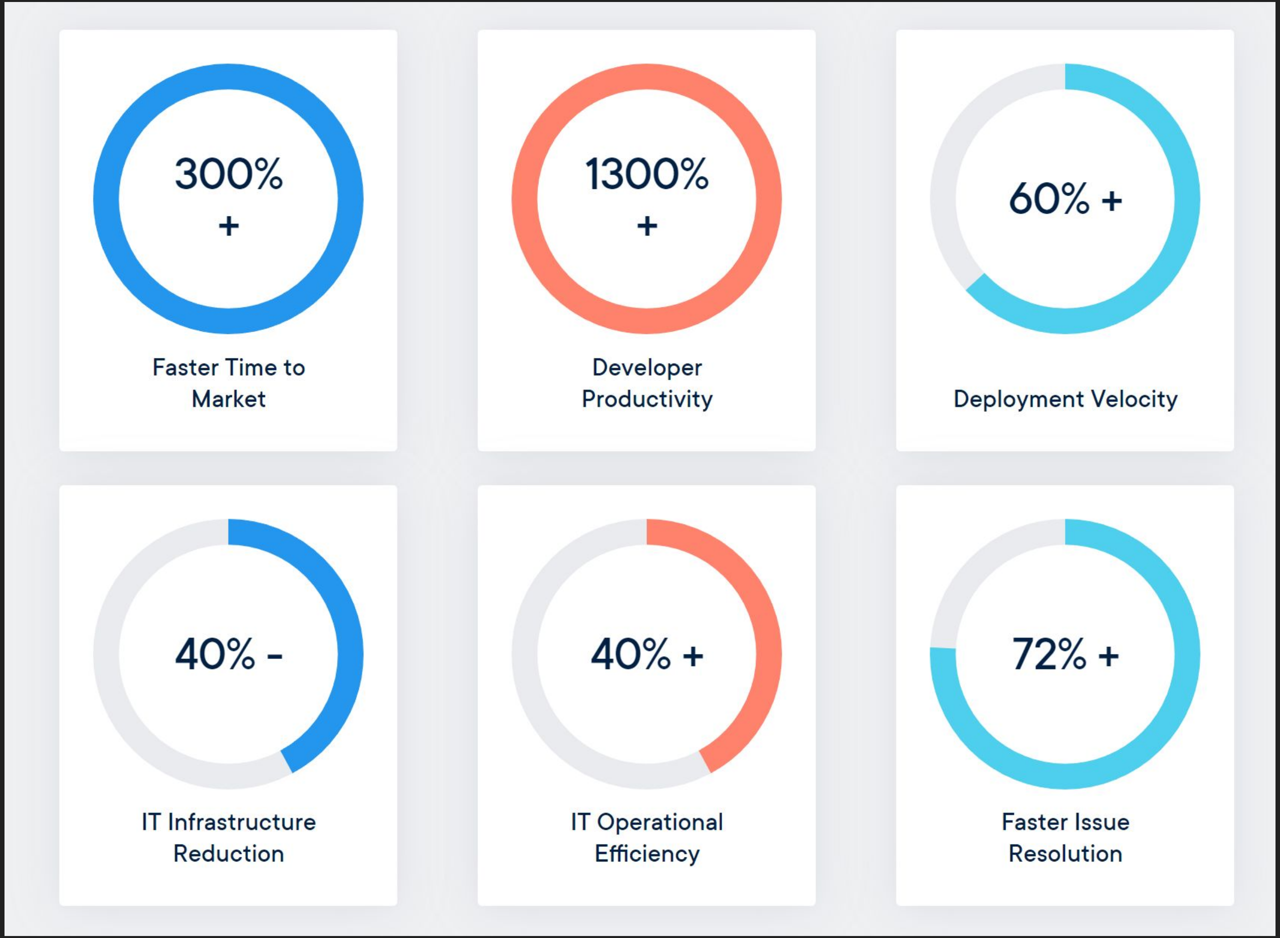
Comparing Containers and Virtual Machines





https://www.docker.com/resources/what-container

Docker를 사용하면 어떤 점이 좋을까요?



https://www.docker.com/why-docker

2. Docker 란?

Docker 를 시작하기 전에 간단하게 알아두어야 할 것.

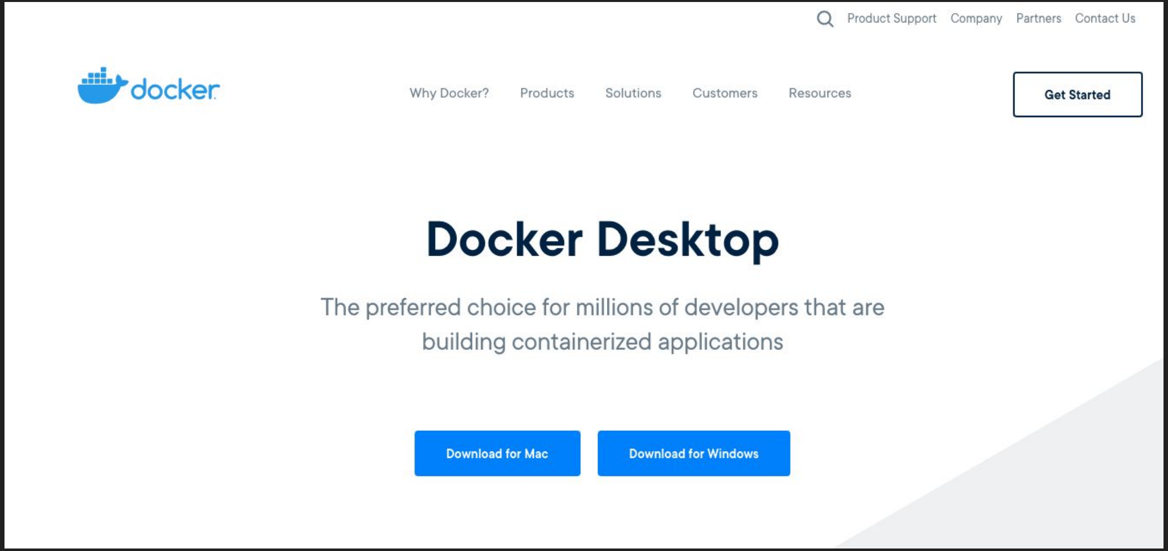
- Linux
- Virtual Machine
- Hipervisor
- Kernel

3. Docker 설치하기

3. Docker 설치하기

https://www.docker.com/products/docker-desktop

설치가 되지 않는다면... Cloud9 으로 사용해봅니다.



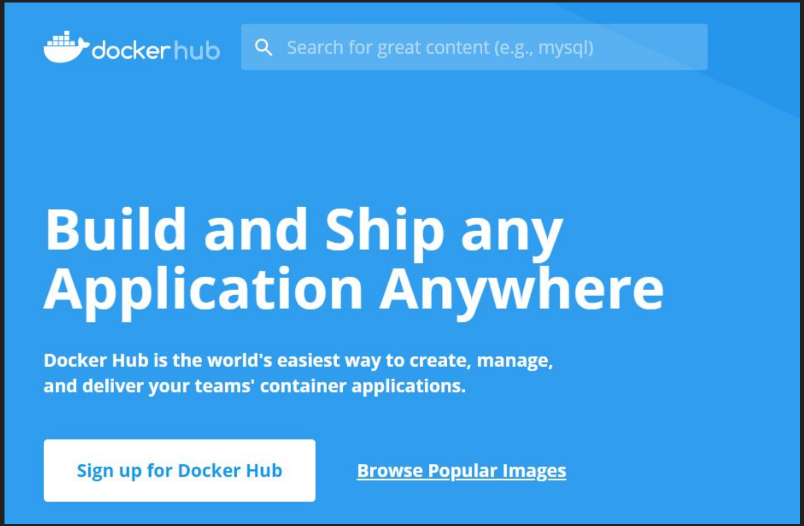
Docker Desktop

The preferred choice for millions of developers that are building containerized applications

3. Docker 설치하기

Docker Hub?

- Docker Hub is the world's easiest way to create, manage, and deliver your teams' container applications.



Build and Ship any Application Anywhere

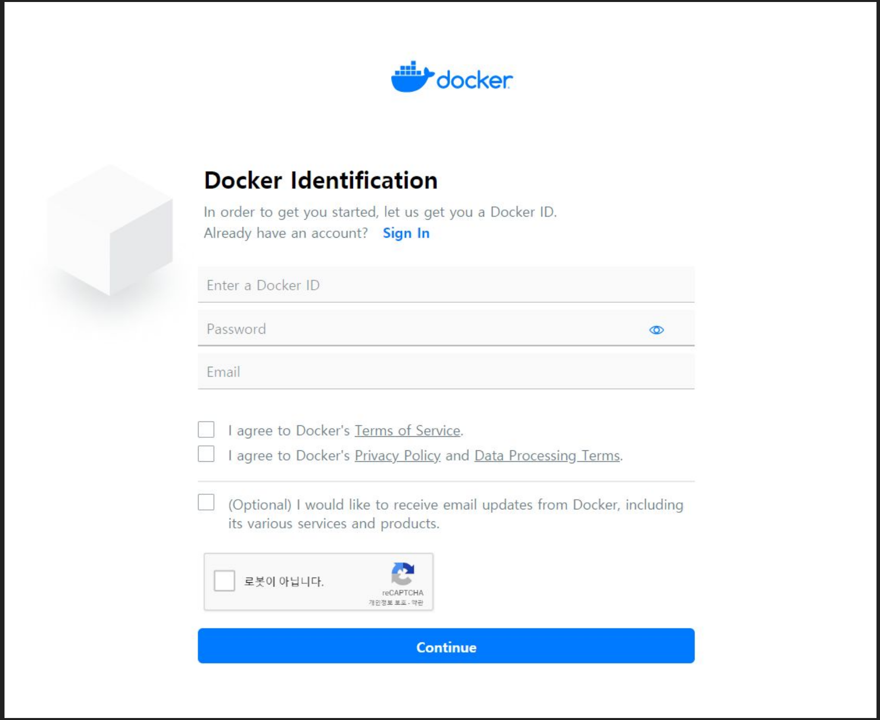
Docker Hub is the world's easiest way to create, manage, and deliver your teams' container applications.

https://docs.docker.com/docker-hub/

3. Docker 설치하기

Docker Hub 가입하기

- https://hub.docker.com/



Docker Identification

In order to get you started, let us get you a Docker ID.
Already have an account? Sign In

Enter a Docker ID

Password

Email

☐ I agree to Docker's Terms of Service.

☐ I agree to Docker's Privacy Policy and Data Processing Terms.

☐ (Optional) I would like to receive email updates from Docker, including its various services and products.

4. Docker CLI 사용하기

4.1 Docker CLI 사용하기

Useful command

- docker images
- docker ps -a
- docker attach
- docker inspect <Conatainer-Name>
- docker run <option>
- docker exec -it <Conatainer-Name> bash
- docker build -t <username>/<image_name>:<TAG> ./
- docker commit <container> <username>/<image_name>:<TAG>

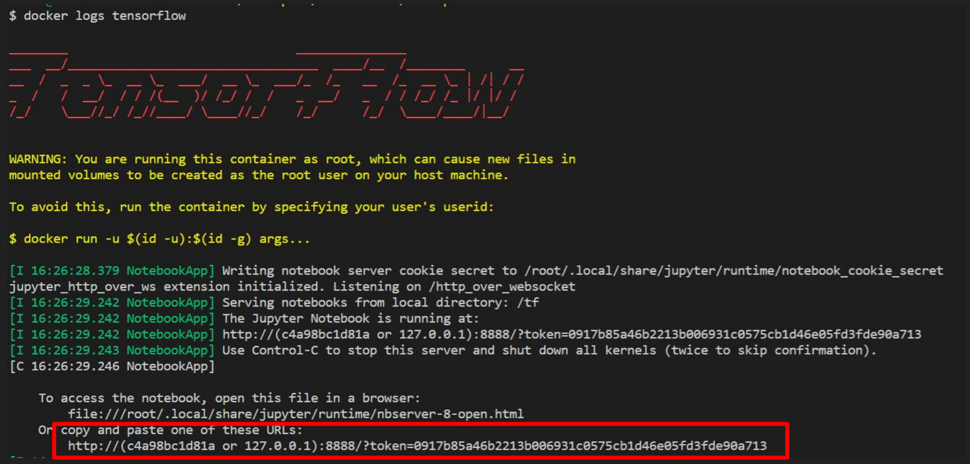
https://docs.docker.com/engine/reference/commandline/cli/

4.2 다양한 언어 사용해보기

- docker run -it --rm node
- docker run -it --rm python
- docker run -it --rm ruby

4.3 Jupyter 노트북 간단히 올려보기

- docker pull tensorflow/tensorflow
- docker run -dit -p 8888:8888 --name tensorflow tensorflow/tensorflow:latest-py3-jupyter
- docker logs tensorflow
  => token 값 복사
- docker stop tensorflow
- docker rm tensorflow



```
$ docker logs tensorflow

________                               _______________
___  __/__________________________________  ____/__  /________      __
__  /  _  _ \_  __ \_  ___/  __ \_  ___/_  /_   __  /_  __ \_ | /| / /
_  /   /  __/  / / /(__  )/ /_/ /  /   _  __/   _  / / /_/ /_ |/ |/ /
/_/    \___//_/ /_//____/ \____//_/    /_/      /_/  \____/____/|__/


WARNING: You are running this container as root, which can cause new files in
mounted volumes to be created as the root user on your host machine.

To avoid this, run the container by specifying your user's userid:

$ docker run -u $(id -u):$(id -g) args...

[I 16:26:28.379 NotebookApp] Writing notebook server cookie secret to /root/.local/share/jupyter/runtime/notebook_cookie_secret
jupyter_http_over_ws extension initialized. Listening on /http_over_websocket
[I 16:26:29.242 NotebookApp] Serving notebooks from local directory: /tf
[I 16:26:29.242 NotebookApp] The Jupyter Notebook is running at:
[I 16:26:29.242 NotebookApp] http://(c4a98bc1d81a or 127.0.0.1):8888/?token=0917b85a46b2213b006931c0575cb1d46e05fd3fde90a713
[I 16:26:29.243 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 16:26:29.246 NotebookApp]

    To access the notebook, open this file in a browser:
        file:///root/.local/share/jupyter/runtime/nbserver-8-open.html
    Or copy and paste one of these URLs:
        http://(c4a98bc1d81a or 127.0.0.1):8888/?token=0917b85a46b2213b006931c0575cb1d46e05fd3fde90a713
```

5. Dockerfile

5. Dockerfile로 Docker image 관리하기

What is Dockerfile?

- Docker can build images automatically by reading the instructions from a Dockerfile. A Dockerfile is a text document that contains all the commands a user could call on the command line to assemble an image. Using docker build users can create an automated build that executes several command-line instructions in succession.

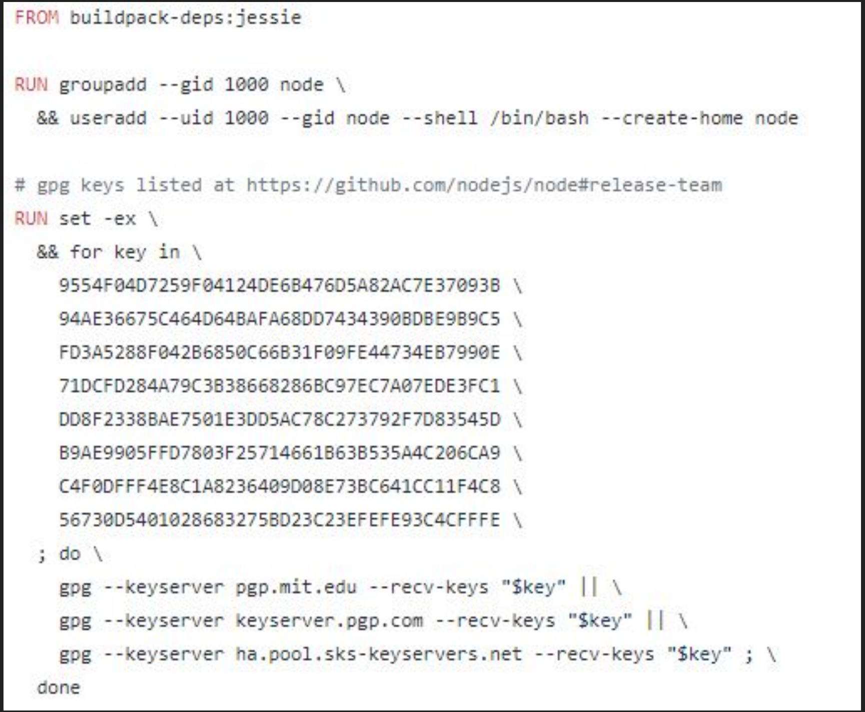
https://docs.docker.com/engine/reference/builder/

5. Dockerfile로 Docker image 관리하기

Dockerfile Instruction

```
FROM <image> [AS <name>]
RUN <command>
CMD command param1 param2
LABEL <key>=<value> <key>=<value> <key>=<value> …
EXPOSE <port> [<port>/<protocol>...]
ENV <key> <value> or ENV <key>=<value> ...
ADD <src>... <dest>
COPY <src>... <dest>
ENTRYPOINT command param1 param2
VOLUME ["/data"]
USER <user>[:<group>] or USER <UID>[:<GID>]
WORKDIR /path/to/workdir
ARG <name>[=<default value>]
ONBUILD [INSTRUCTION]
```

5. Dockerfile로 Docker image 관리하기



```
FROM buildpack-deps:jessie

RUN groupadd --gid 1000 node \
  && useradd --uid 1000 --gid node --shell /bin/bash --create-home node

# gpg keys listed at https://github.com/nodejs/node#release-team
RUN set -ex \
  && for key in \
    9554F04D7259F04124DE6B476D5A82AC7E37093B \
    94AE36675C464D64BAFA68DD7434390BDBE9B9C5 \
    FD3A5288F042B6850C66B31F09FE44734EB7990E \
    71DCFD284A79C3B38668286BC97EC7A07EDE3FC1 \
    DD8F2338BAE7501E3DD5AC78C273792F7D83545D \
    B9AE9905FFD7803F25714661B63B535A4C206CA9 \
    C4F0DFFF4E8C1A8236409D08E73BC641CC11F4C8 \
    56730D5401028683275BD23C23EFEFE93C4CFFFE \
  ; do \
    gpg --keyserver pgp.mit.edu --recv-keys "$key" || \
    gpg --keyserver keyserver.pgp.com --recv-keys "$key" || \
    gpg --keyserver ha.pool.sks-keyservers.net --recv-keys "$key" ; \
  done
```

https://github.com/nodejs/docker-node/blob/c37d5e87fa6d46c0e387f73161b056bbf90b83aa/8.6/Dockerfile

Alpine Linux

Alpine Linux is a security-oriented, lightweight Linux distribution based on musl libc and busybox.

https://alpinelinux.org/

5. Dockerfile로 Docker image 관리하기

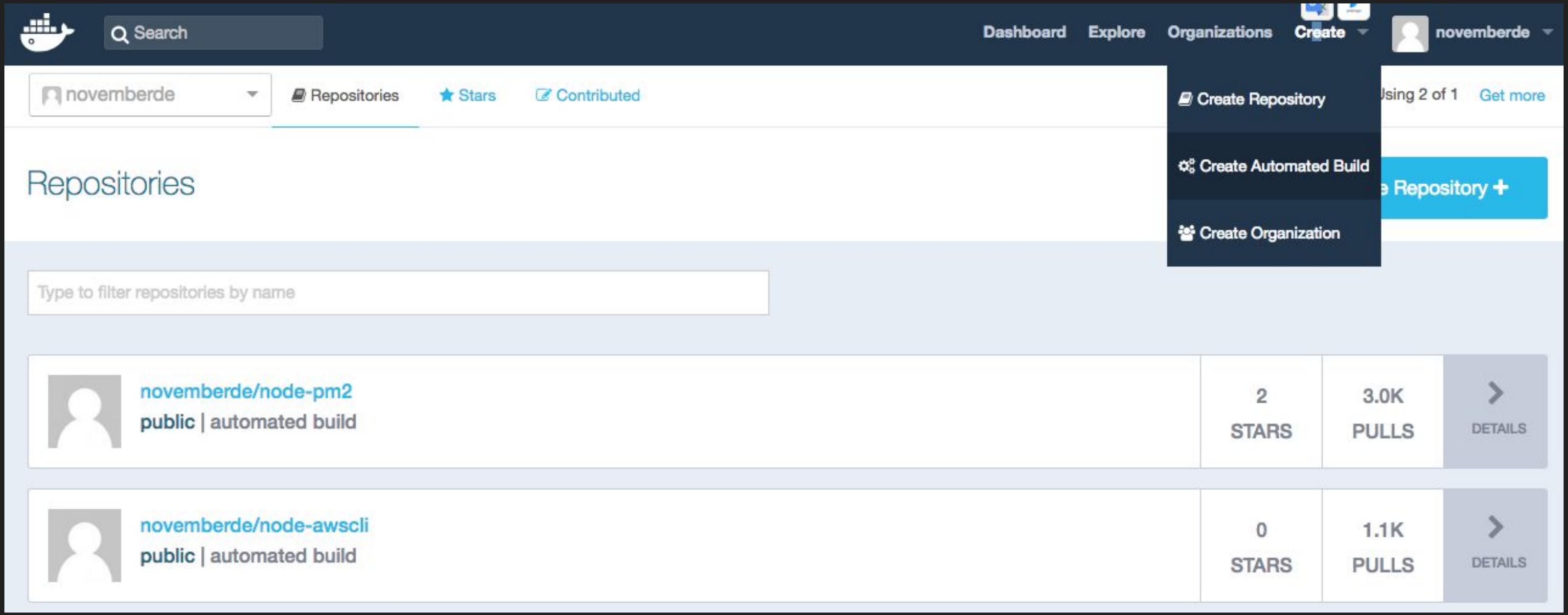
Dockerfile reference

- https://docs.docker.com/engine/reference/builder/
- https://hub.docker.com/r/novemberde/docker_node_server/~/dockerfile/
- https://hub.docker.com/_/jenkins/
- https://hub.docker.com/_/redis/
- https://hub.docker.com/r/wnameless/oracle-xe-11g/
- https://hub.docker.com/_/mysql/
- https://hub.docker.com/_/mongo/
- https://github.com/novemberde/docker_node_server

6. Automated Build

6. Automated build로 docker image 반영하기

https://novemberde.github.io/2017/04/02/Docker_8.html

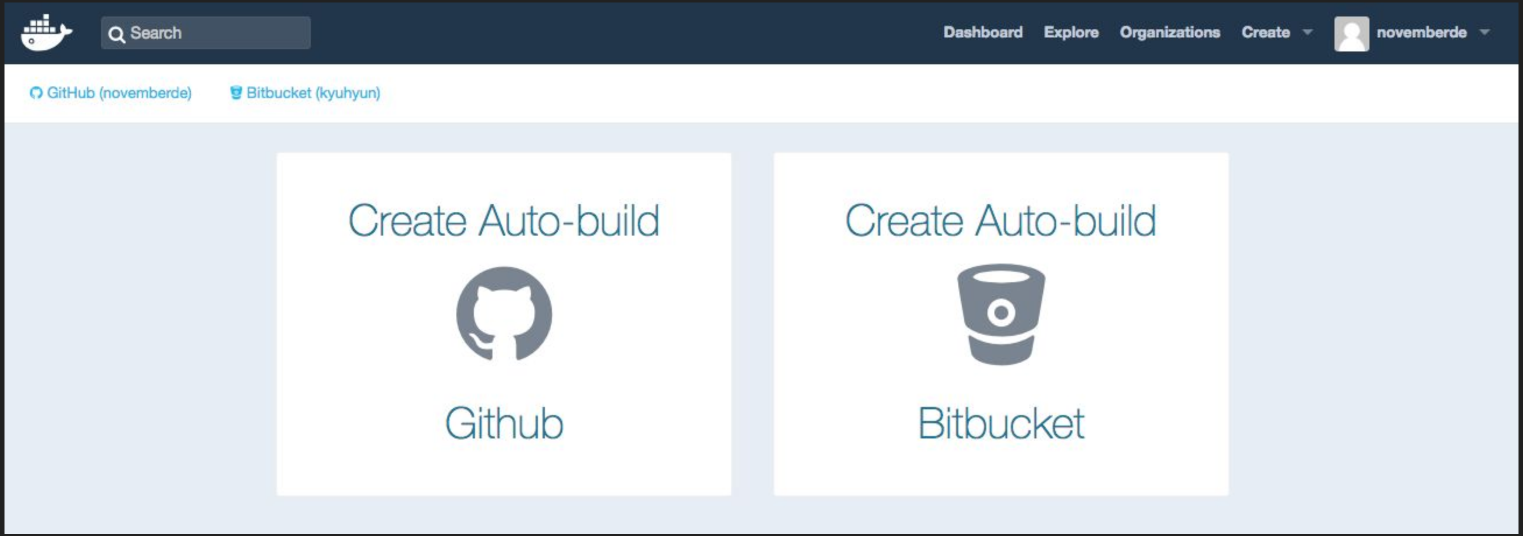


novemberde/node-pm2
public | automated build
2 STARS | 3.0K PULLS | DETAILS

novemberde/node-awscli
public | automated build
0 STARS | 1.1K PULLS | DETAILS

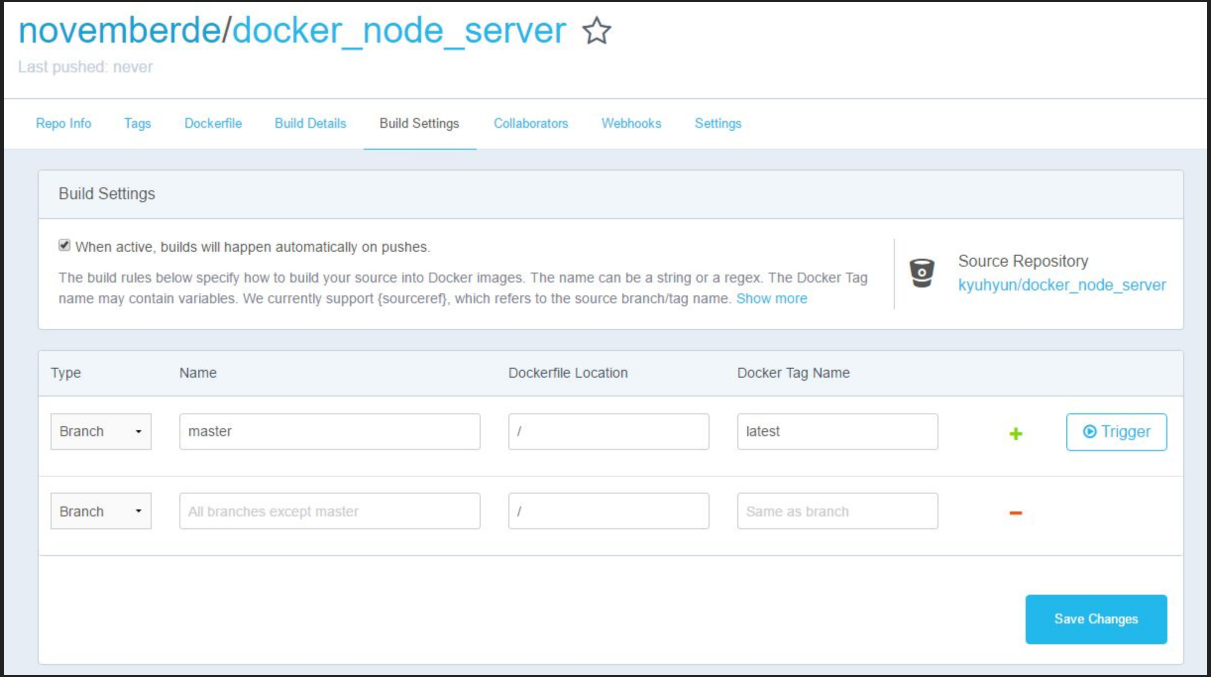
6. Automated build로 docker image 반영하기

https://novemberde.github.io/2017/04/02/Docker_8.html



6. Automated build로 docker image 반영하기

https://novemberde.github.io/2017/04/02/Docker_8.html


novemberde/docker_node_server

Last pushed: never

Build Settings

☑ When active, builds will happen automatically on pushes.

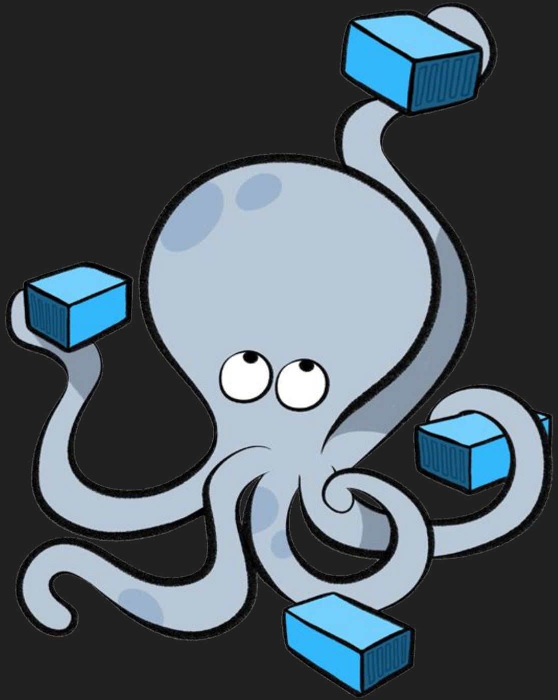
The build rules below specify how to build your source into Docker images. The name can be a string or a regex. The Docker Tag name may contain variables. We currently support {sourceref}, which refers to the source branch/tag name. Show more

Source Repository
kyuhyun/docker_node_server

Type	Name	Dockerfile Location	Docker Tag Name
Branch	master	/	latest
Branch	All branches except master	/	Same as branch

7. docker-compose

7. docker-compose 란?



https://severalnines.com/sites/default/files/Compose.png

7. docker-compose 란?

- Compose is a tool for defining and running multi-container Docker applications. With Compose, you use a YAML file to configure your application’s services. Then, with a single command, you create and start all the services from your configuration. To learn more about all the features of Compose, see the list of features.
- Compose works in all environments: production, staging, development, testing, as well as CI workflows. You can learn more about each case in Common Use Cases.

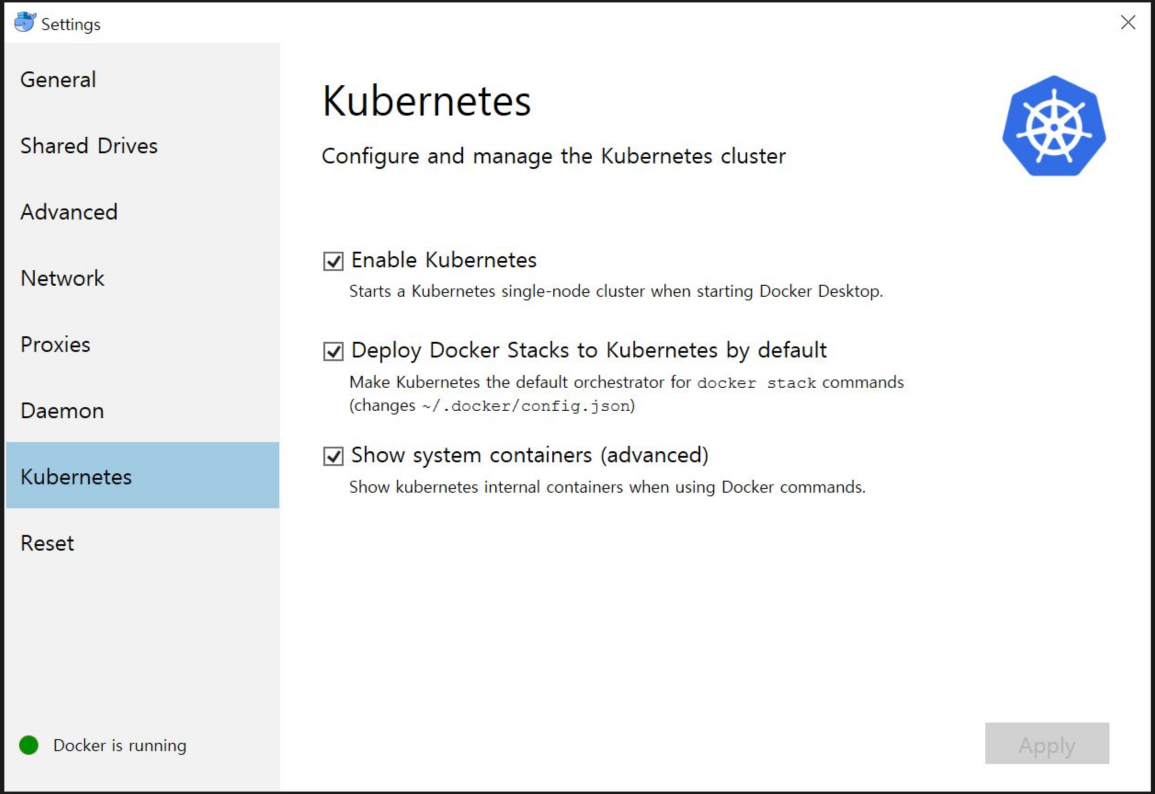
https://severalnines.com/sites/default/files/Compose.png

7. docker-compose 파일 작성하기

```
version: '3.1'

services:
  wordpress:
    image: wordpress
    restart: always
    ports:
      - 40001:80
    environment:
      WORDPRESS_DB_HOST: db
      WORDPRESS_DB_USER: exampleuser
      WORDPRESS_DB_PASSWORD: examplepass
      WORDPRESS_DB_NAME: exampledb
  db:
    image: mysql:5.7
    restart: always
    environment:
      MYSQL_DATABASE: exampledb
      MYSQL_USER: exampleuser
      MYSQL_PASSWORD: examplepass
      MYSQL_RANDOM_ROOT_PASSWORD: '1'
```

7.1 Kubernetes를 기본 stack으로 설정하기



Kubernetes

Configure and manage the Kubernetes cluster

[✓] Enable Kubernetes

Starts a Kubernetes single-node cluster when starting Docker Desktop.

[✓] Deploy Docker Stacks to Kubernetes by default

Make Kubernetes the default orchestrator for `docker stack` commands (changes `~/.docker/config.json`)

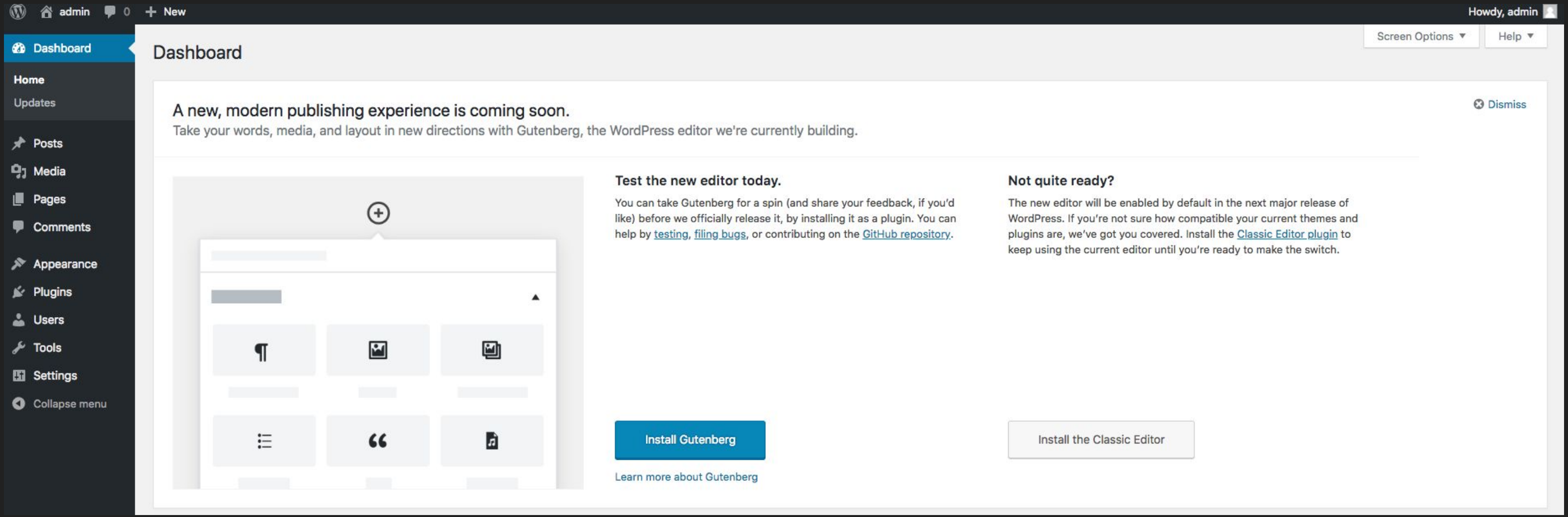
[✓] Show system containers (advanced)

Show kubernetes internal containers when using Docker commands.

7.3 docker-compose 파일기반으로 배포하기

배포하기

- docker stack deploy -c stack.yml wordpress



Dashboard

A new, modern publishing experience is coming soon.
Take your words, media, and layout in new directions with Gutenberg, the WordPress editor we're currently building.

Test the new editor today.
You can take Gutenberg for a spin (and share your feedback, if you'd like) before we officially release it, by installing it as a plugin. You can help by testing, filing bugs, or contributing on the GitHub repository.

Not quite ready?
The new editor will be enabled by default in the next major release of WordPress. If you're not sure how compatible your current themes and plugins are, we've got you covered. Install the Classic Editor plugin to keep using the current editor until you're ready to make the switch.

7.4 docker stack 명령어

- docker stack ls : List stacks
- docker stack ps wordpress : List the tasks in the stack
- docker stack services wordpress : List the services in the stack
- docker stack rm wordpress : Remove one or more stacks

7.5 docker-compose 명령어

* docker-compose 명령어는 docker-compose.yml 파일을 기본으로 사용함.

- docker-compose up -d : Create and start containers
- docker-compose ps : List containers
- docker-compose top : Display the running processes
- docker-compose down : Stop and remove containers, networks, images, and volumes

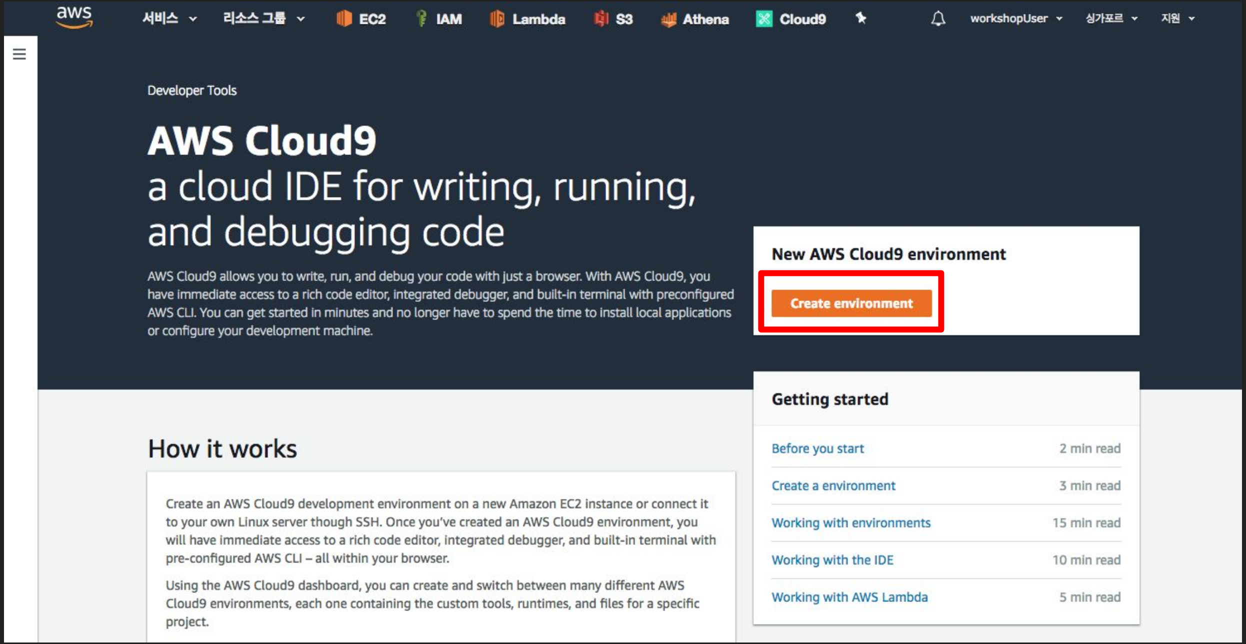
부록 1. Cloud9 생성하기

AWS Cloud 9 이란?

- 브라우저만으로 코드를 작성, 실행 및 디버깅할 수 있게 해주는 클라우드 기반 IDE
- JavaScript, Python, PHP를 비롯하여 널리 사용되는 프로그래밍 언어를 위한 필수 도구가 사전에 패키징되어 제공
- 클라우드 기반이므로, 인터넷이 연결된 머신을 사용하여 사무실, 집 또는 어디서든 프로젝트 작업 가능
- 도커 애플리케이션을 개발할 수 있는 원활한 환경을 제공

부록 1. Cloud9 생성하기

- https://ap-northeast-1.console.aws.amazon.com/cloud9/home/product



Developer Tools

AWS Cloud9

a cloud IDE for writing, running, and debugging code

AWS Cloud9 allows you to write, run, and debug your code with just a browser. With AWS Cloud9, you have immediate access to a rich code editor, integrated debugger, and built-in terminal with preconfigured AWS CLI. You can get started in minutes and no longer have to spend the time to install local applications or configure your development machine.

New AWS Cloud9 environment

Create environment

Getting started

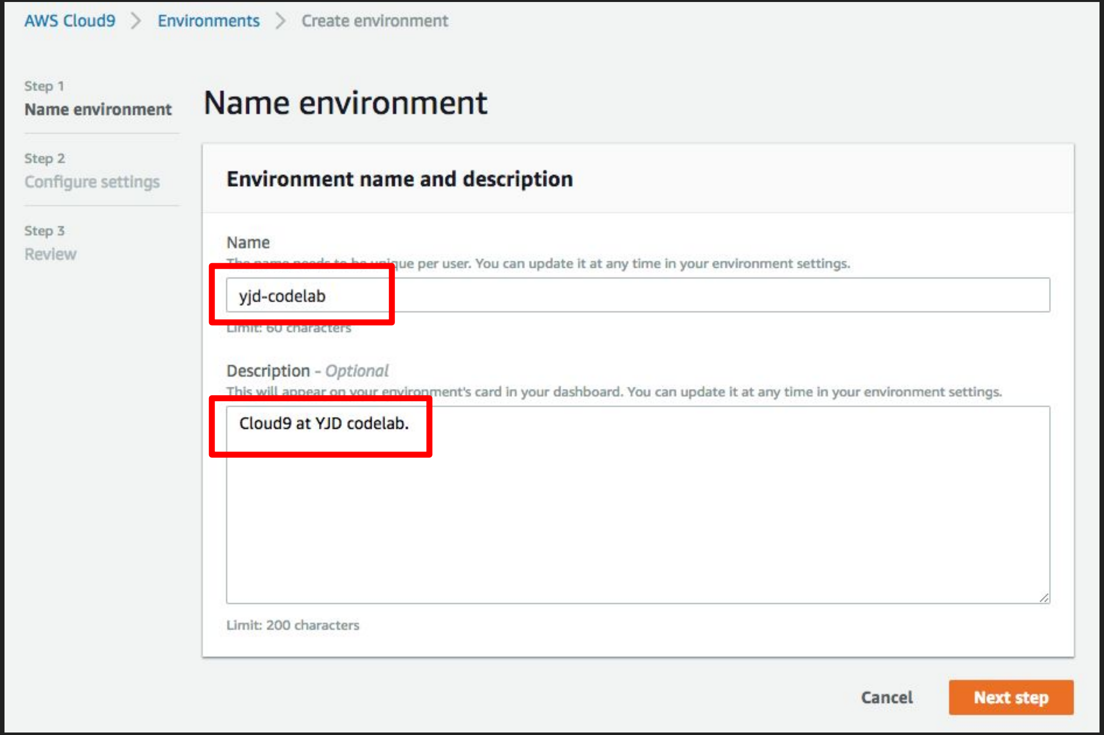
Before you start	2 min read
Create a environment	3 min read
Working with environments	15 min read
Working with the IDE	10 min read
Working with AWS Lambda	5 min read

How it works

Create an AWS Cloud9 development environment on a new Amazon EC2 instance or connect it to your own Linux server though SSH. Once you've created an AWS Cloud9 environment, you will have immediate access to a rich code editor, integrated debugger, and built-in terminal with pre-configured AWS CLI – all within your browser.

Using the AWS Cloud9 dashboard, you can create and switch between many different AWS Cloud9 environments, each one containing the custom tools, runtimes, and files for a specific project.

부록 1. Cloud9 생성하기



AWS Cloud9 > Environments > Create environment

Step 1
Name environment

Step 2
Configure settings

Step 3
Review

Name environment

Environment name and description

Name
The name needs to be unique per user. You can update it at any time in your environment settings.

yjd-codelab

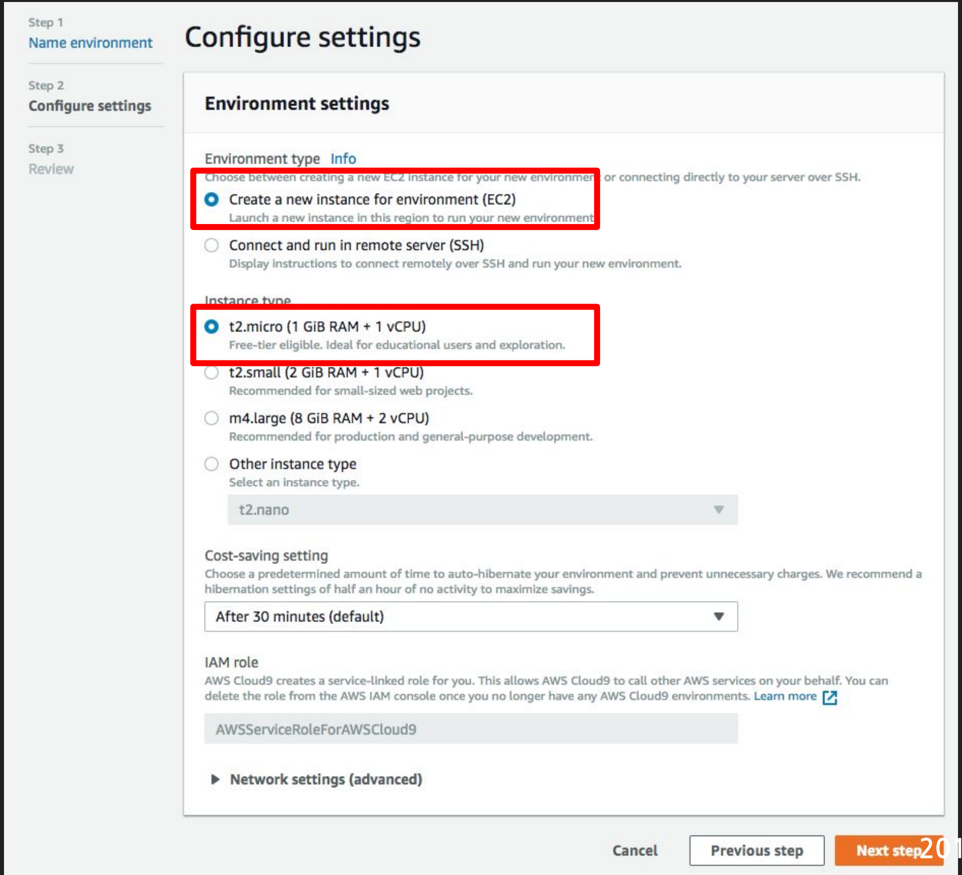
Limit: 60 characters

Description - *Optional*
This will appear on your environment's card in your dashboard. You can update it at any time in your environment settings.

Cloud9 at YJD codelab.

Limit: 200 characters

부록 1. Cloud9 생성하기



Step 1
Name environment

Step 2
Configure settings

Step 3
Review

Configure settings

Environment settings

Environment type Info
Choose between creating a new EC2 instance for your new environment or connecting directly to your server over SSH.

- [✓ Create a new instance for environment (EC2)]
  Launch a new instance in this region to run your new environment
- Connect and run in remote server (SSH)
  Display instructions to connect remotely over SSH and run your new environment.

Instance type

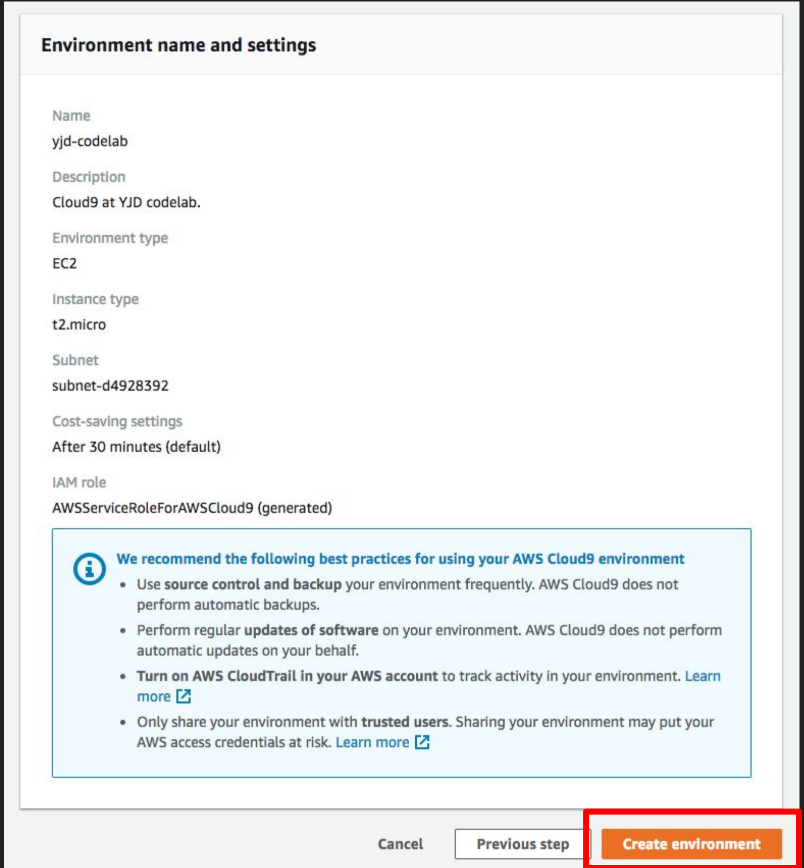
- [✓ t2.micro (1 GiB RAM + 1 vCPU)]
  Free-tier eligible. Ideal for educational users and exploration.
- t2.small (2 GiB RAM + 1 vCPU)
  Recommended for small-sized web projects.
- m4.large (8 GiB RAM + 2 vCPU)
  Recommended for production and general-purpose development.
- Other instance type
  Select an instance type.
  t2.nano

Cost-saving setting
Choose a predetermined amount of time to auto-hibernate your environment and prevent unnecessary charges. We recommend a hibernation settings of half an hour of no activity to maximize savings.
After 30 minutes (default)

IAM role
AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more
AWSServiceRoleForAWSCloud9

▶ Network settings (advanced)

부록 1. Cloud9 생성하기



Environment name and settings

Name
yjd-codelab

Description
Cloud9 at YJD codelab.

Environment type
EC2

Instance type
t2.micro

Subnet
subnet-d4928392

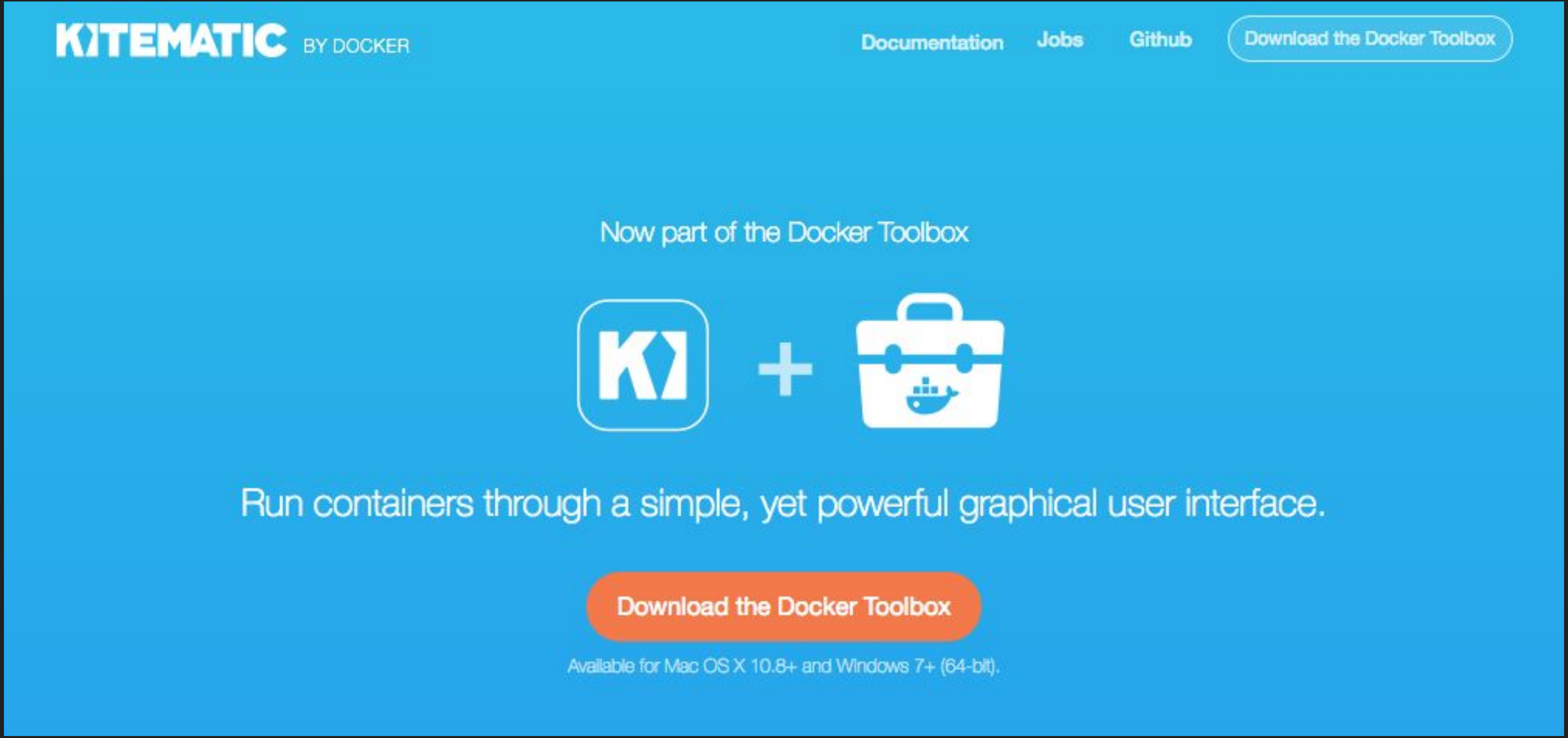
Cost-saving settings
After 30 minutes (default)

IAM role
AWSServiceRoleForAWSCloud9 (generated)

We recommend the following best practices for using your AWS Cloud9 environment

- Use **source control and backup** your environment frequently. AWS Cloud9 does not perform automatic backups.
- Perform regular **updates of software** on your environment. AWS Cloud9 does not perform automatic updates on your behalf.
- **Turn on AWS CloudTrail in your AWS account** to track activity in your environment. Learn more
- Only share your environment with **trusted users**. Sharing your environment may put your AWS access credentials at risk. Learn more

부록 2. Kitematic으로 손쉽게 Docker 사용하기



KITEMATIC BY DOCKER

Documentation Jobs Github Download the Docker Toolbox

Now part of the Docker Toolbox

Run containers through a simple, yet powerful graphical user interface.

Download the Docker Toolbox

Available for Mac OS X 10.8+ and Windows 7+ (64-bit).

https://kitematic.com/

부록 2. Kitematic으로 손쉽게 Docker 사용하기

Kitematic

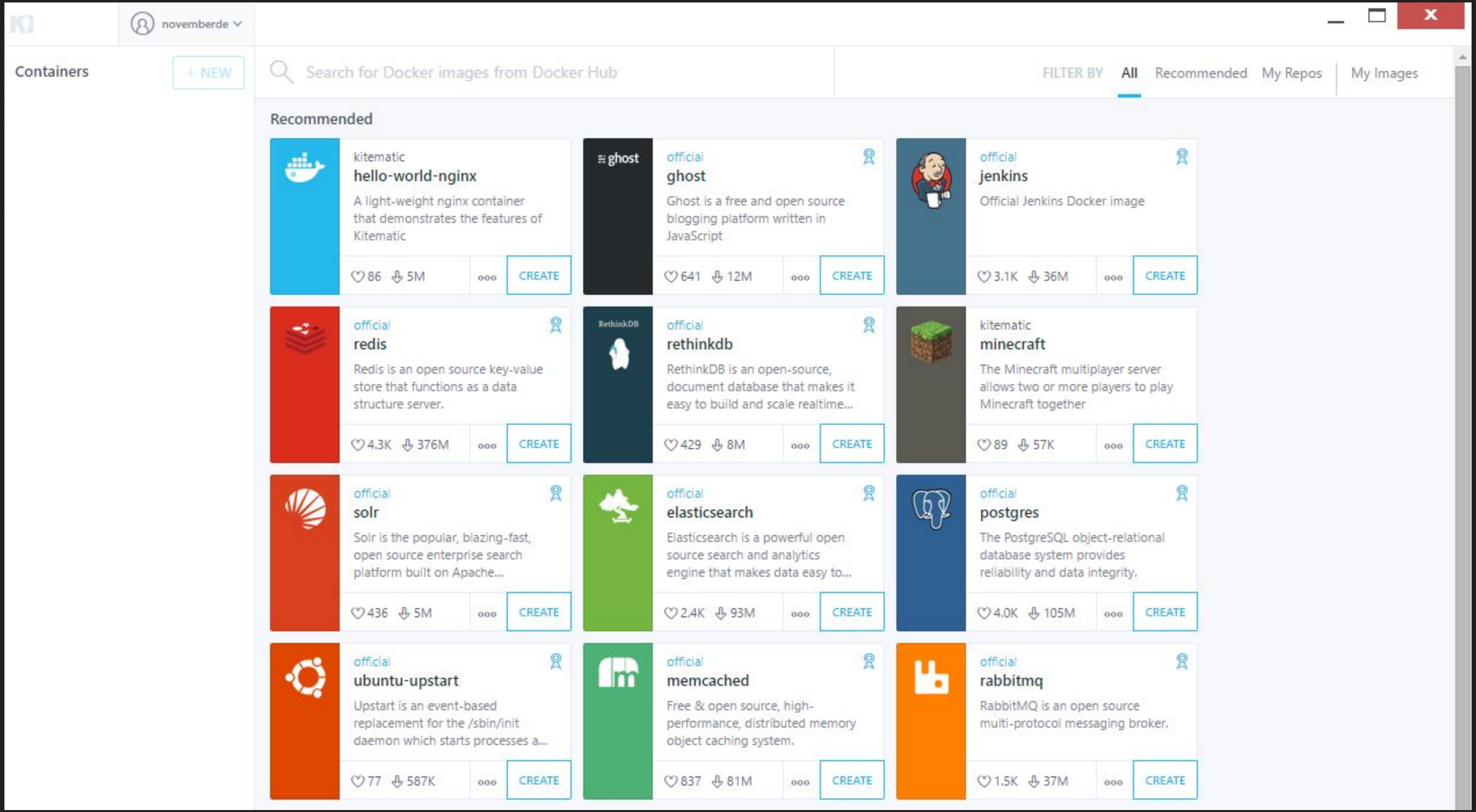
- Fast and Easy Setup
- Docker Hub Integration
- Seamless Experience Between CLI and GUI
- Advanced Features

  Automatically map ports

  Visually change environment variables, configuring volumes, streamline logs and CLI access to containers

https://kitematic.com/

부록 2. Kitematic으로 손쉽게 Docker 사용하기



Recommended

kitematic
hello-world-nginx
A light-weight nginx container that demonstrates the features of Kitematic
86 5M CREATE

official
ghost
Ghost is a free and open source blogging platform written in JavaScript
641 12M CREATE

official
jenkins
Official Jenkins Docker image
3.1K 36M CREATE

official
redis
Redis is an open source key-value store that functions as a data structure server.
4.3K 376M CREATE

official
rethinkdb
RethinkDB is an open-source, document database that makes it easy to build and scale realtime...
429 8M CREATE

kitematic
minecraft
The Minecraft multiplayer server allows two or more players to play Minecraft together
89 57K CREATE

official
solr
Solr is the popular, blazing-fast, open source enterprise search platform built on Apache...
436 5M CREATE

official
elasticsearch
Elasticsearch is a powerful open source search and analytics engine that makes data easy to...
2.4K 93M CREATE

official
postgres
The PostgreSQL object-relational database system provides reliability and data integrity.
4.0K 105M CREATE

official
ubuntu-upstart
Upstart is an event-based replacement for the /sbin/init daemon which starts processes a...
77 587K CREATE

official
memcached
Free & open source, high-performance, distributed memory object caching system.
837 81M CREATE

official
rabbitmq
RabbitMQ is an open source multi-protocol messaging broker.
1.5K 37M CREATE

References

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Thank you!

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