



# **Infrastructure and Deployment**



Docker



System and Software  
Deployment



CI / CD

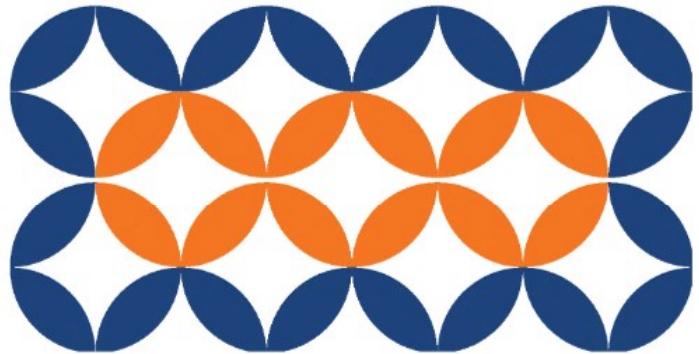


Kubernetes

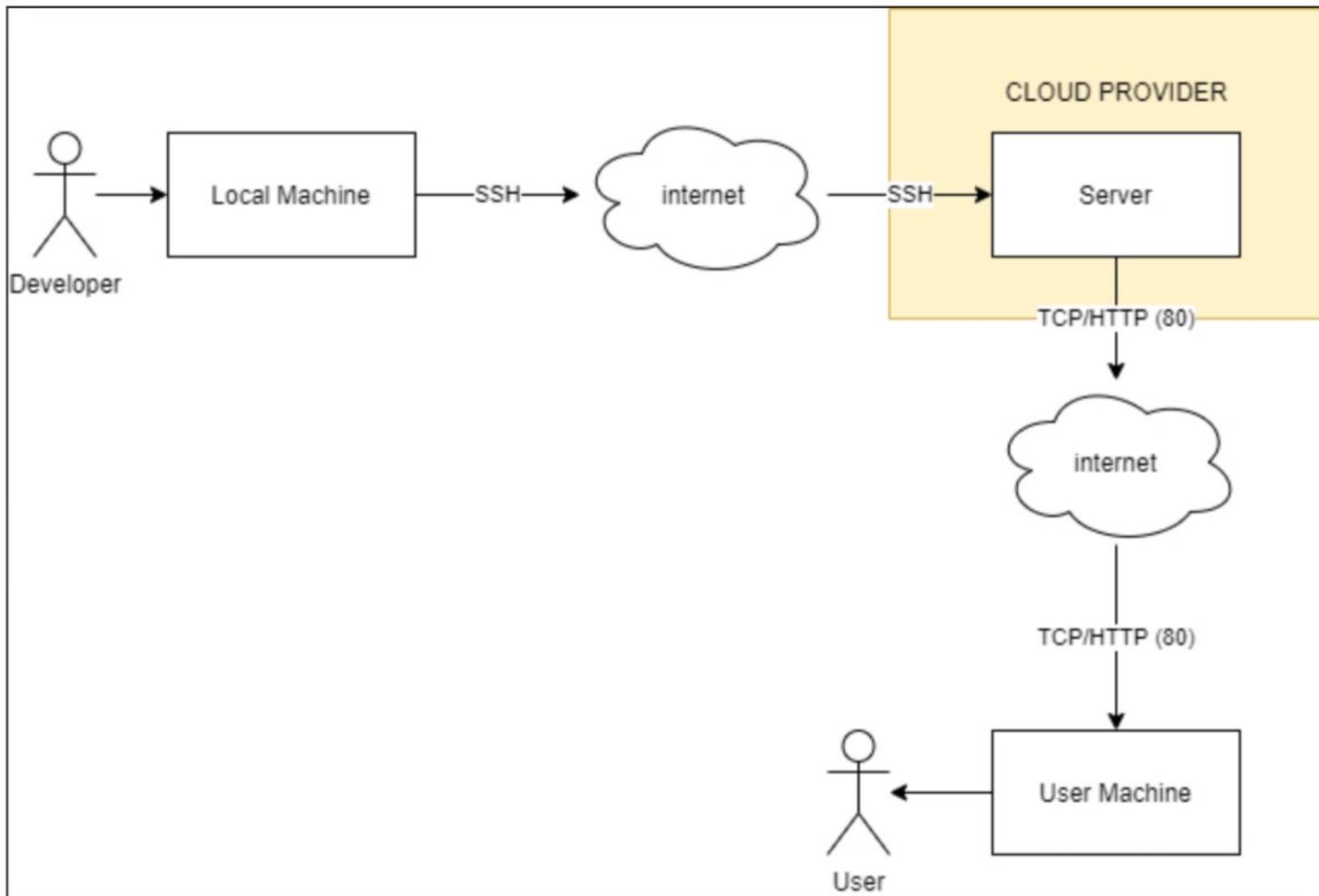
# PART I



Docker

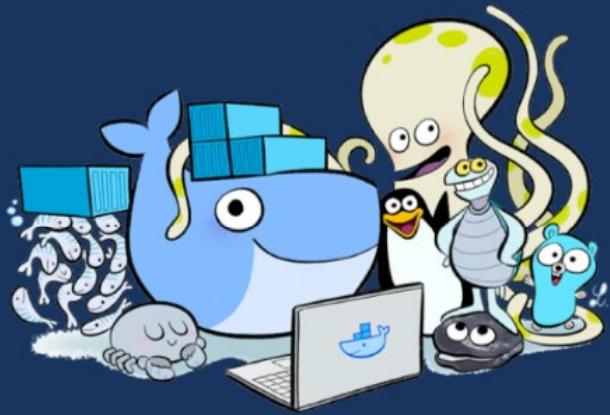


# **What we will learn?**



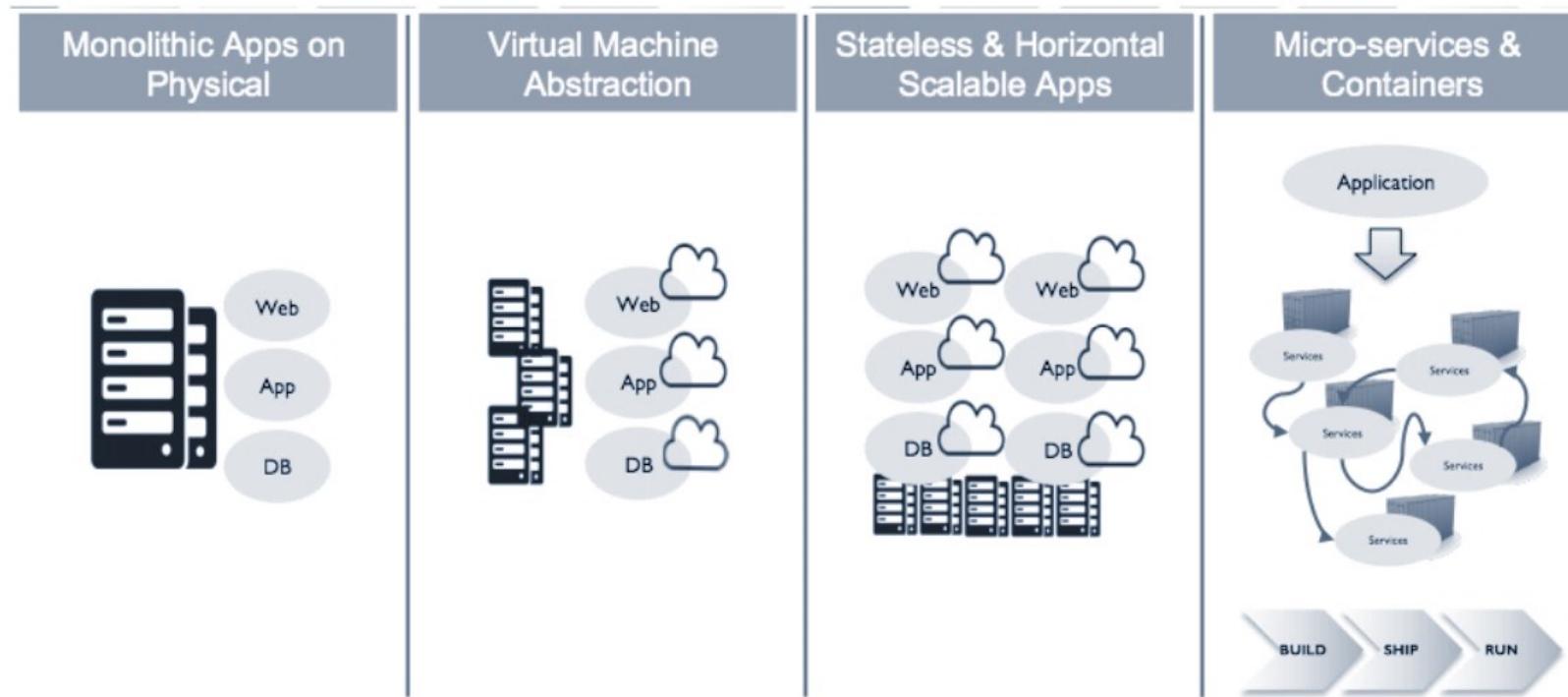
# LEARN HOW

- containers work
- to launch containers using Docker
- to build and launch your own container images
- to deploy your applications as containers



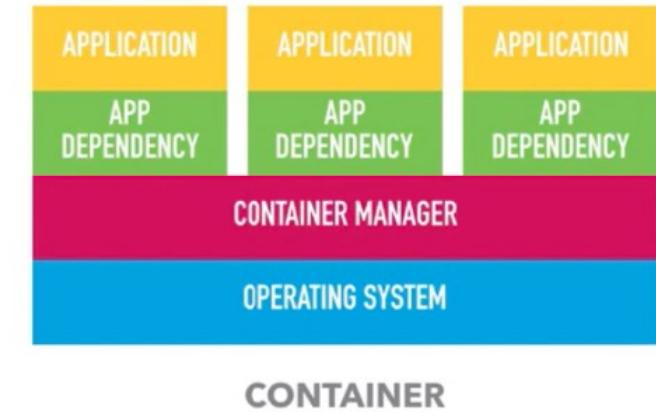
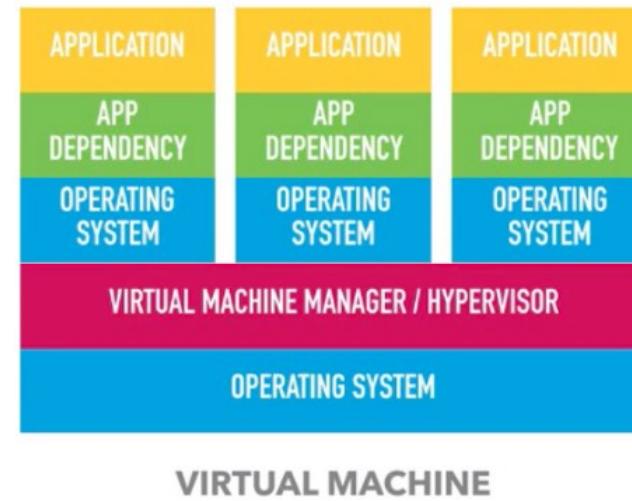


# Application Deployment History





# Container VS Virtual Machines



[www.docker.com](http://www.docker.com)

# What is a container ?

A container is not a virtual machine.

**Short Answer:** A container is a process...with file system isolation.

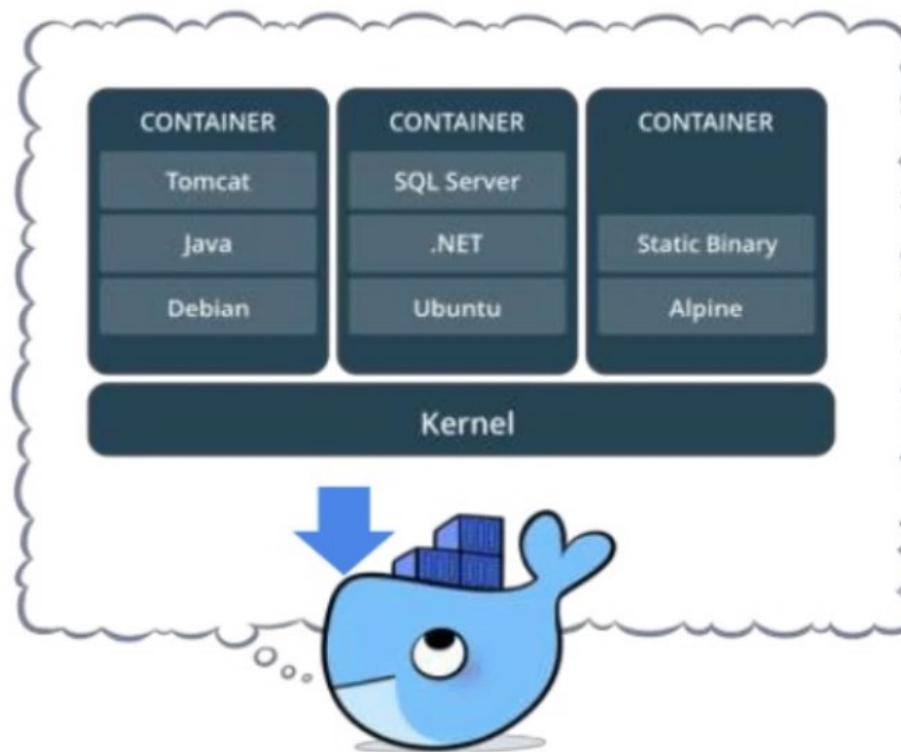
**Long Answer:** Everything in Linux is a file.

- /dev/sda = hard disk
- /dev/proc = processes
- /dev/usb
- /dev/cpu
- /dev/std(in|out)
- /bin/bash... just a binary file





# Container is ..



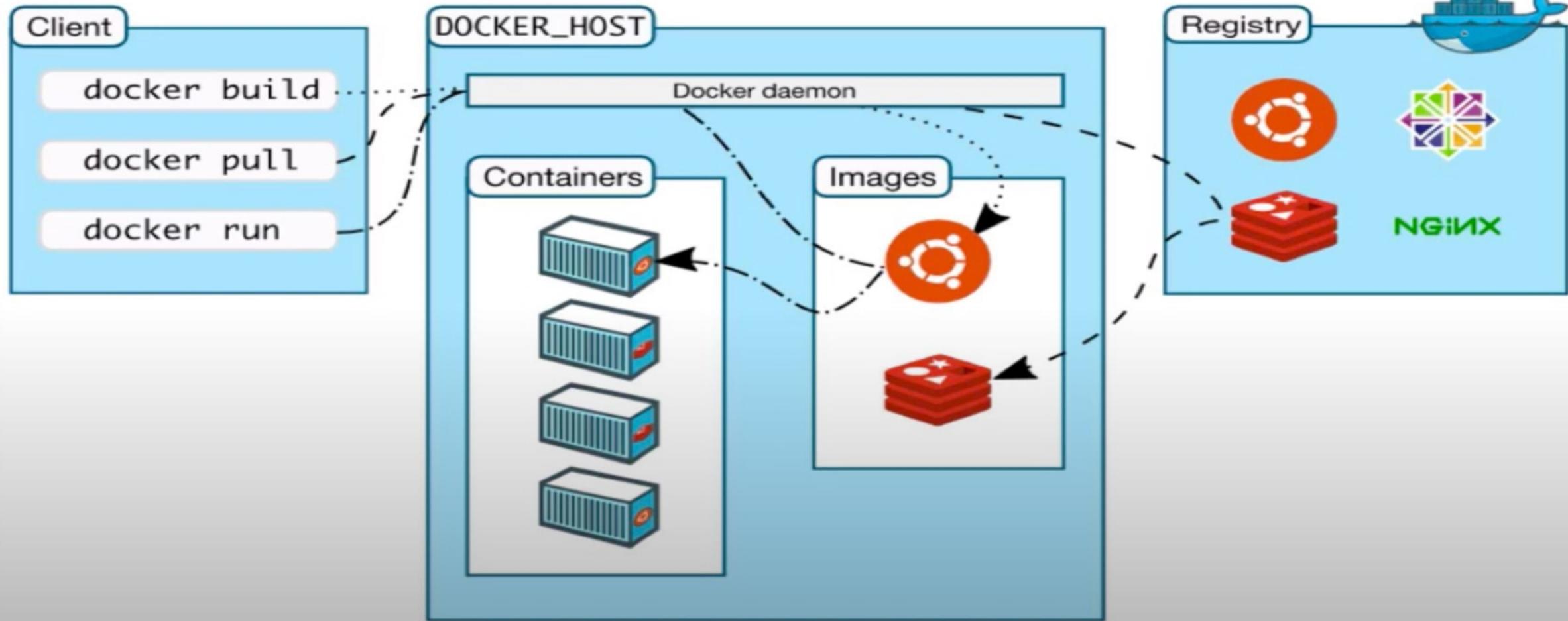


Container	Virtual Machines
Abstraction at the app layer	Abstraction of physical hardware.
Containers take up less space than VMs (container images are typically tens of MBs in size)	Each VM includes a full copy of an operating system
Handle more applications and require fewer VMs and Operating systems.	Also be slow to boot.

# Docker Basics

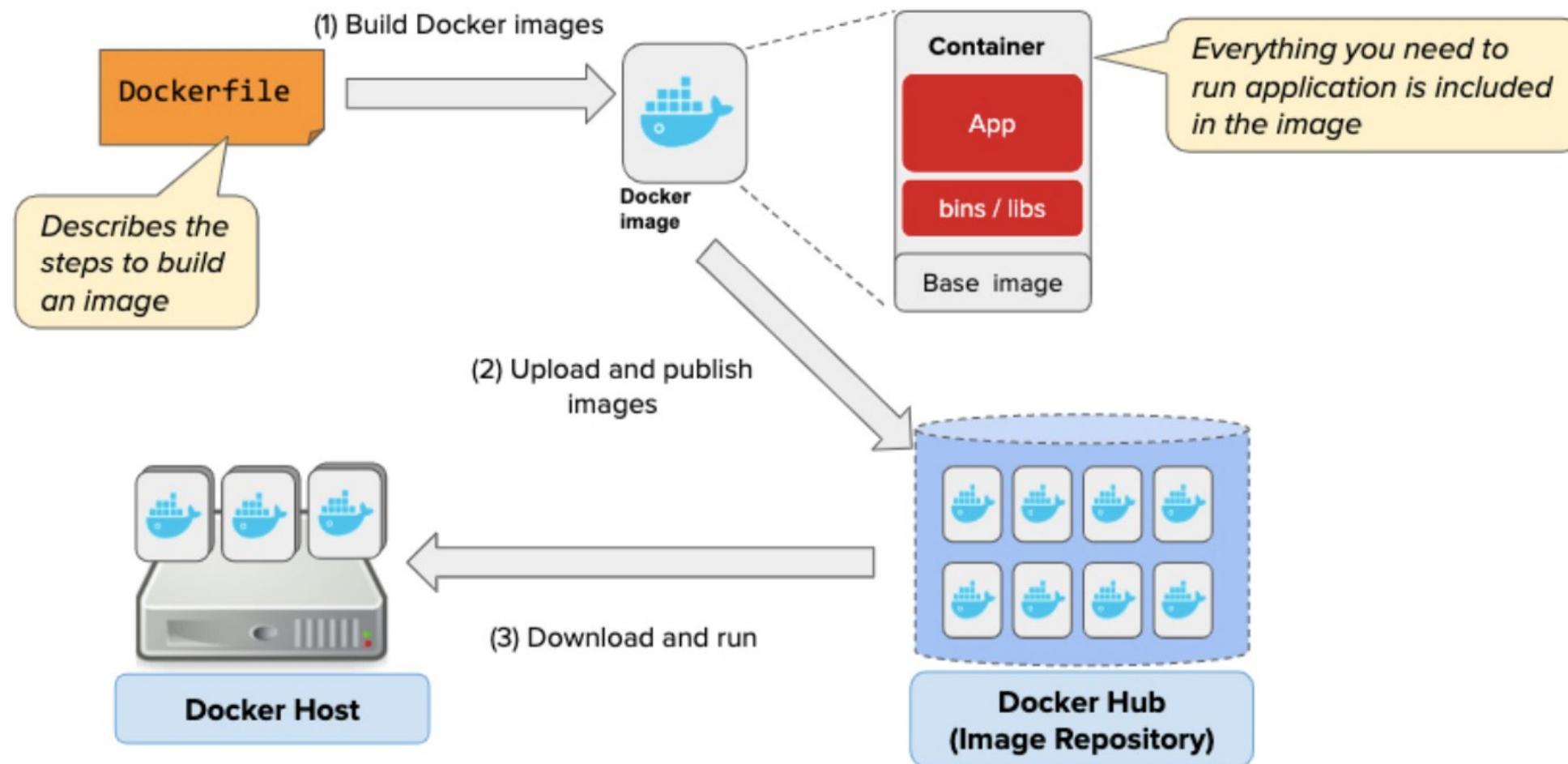


# Docker Infrastructure





# What you can do with Docker ?





Syntax	Definition
FROM	Getting image from docker registry
RUN	Execute bash command when building container
ENV	Set variable inside container
ADD	Copy the file with some other process
COPY	Copy the file
WORKDIR	Set working file directory
ENTRYPOINT	Execute command when finish building container
CMD	Execute command but can be overwrite

# TUGAS



03/18/19

## Dockerize Application

1. Install docker & docker compose
2. Create dockerfile.
3. Clone your code and integrate to your dockerfile.
4. Build your container
5. Push the image to docker registry
6. Deploy in your local machine
7. Try DockerCompose to run go app + mysql (opt.)
8. Try to Deploy in the Cloud (opt.)



# Build and Store Your Own Container

```
FROM golang:1.16-alpine
WORKDIR /app
COPY go.mod ./
COPY go.sum ./
RUN go mod download
COPY *.go ./
RUN go build -o /docker-gs-ping
EXPOSE 8080
CMD [ "/docker-gs-ping" ]
```



# Build and Store Your Own Container

Build a container :

```
$ docker build -t flask-tutorial:latest .
```

Login to your container registry :

```
docker login --username=yourusername
```

Tag and push your container image :

```
$ docker tag 557bec4698b6  
ian18ishar/flask-tutorial:1.0  
$ docker push ian18ishar/flask-tutorial
```

Tag and push your container image :

```
$ docker pull ian18ishar/flask-tutorial:1.0  
$ docker run -d -p 5000:5000 --name flaskdemo  
ian18ishar/flask-tutorial:1.0
```

# **Analogies & Big Concepts Diagram**

<https://drive.google.com/file/d/13BrfTz8c9nn6-7SCqAQItifnFNWbjEhb/view?usp=sharing>

# Tidak bisa run docker di laptop

- Bisa dual boot ke linux:

<https://wiki.ubuntu.com/LiveUsbPendrivePersistent>

- Gunakan Cloud Compute Engine



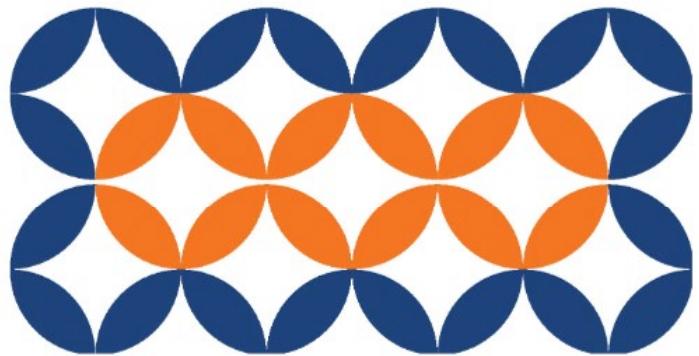
**“Devs are from venus,  
Ops are from mars”**

**Steven Haines**

# PART III



# Introduction Deployment



## What we will learn?



Definisi &  
Strategi  
Deployment



Deployment  
Cycle



Proses  
Deployment



GIT sebagai  
Repository



AWS



Linux Server  
(remote server,  
transfer file)



Setup dan  
Instalasi  
Webserver



Setup Domain  
dan HTTPS



# System & Software Deployment

**Deployment** adalah kegiatan yang bertujuan untuk menyebarkan aplikasi/produk yang telah dikerjakan oleh para pengembang seringkali untuk mengubah dari status **sementara** ke **permanen**. Penyebarannya dapat melalui beragam cara tergantung dari jenis aplikasinya, aplikasi web & api ke server sedangkan aplikasi mobile ke Playstore/Appstore.





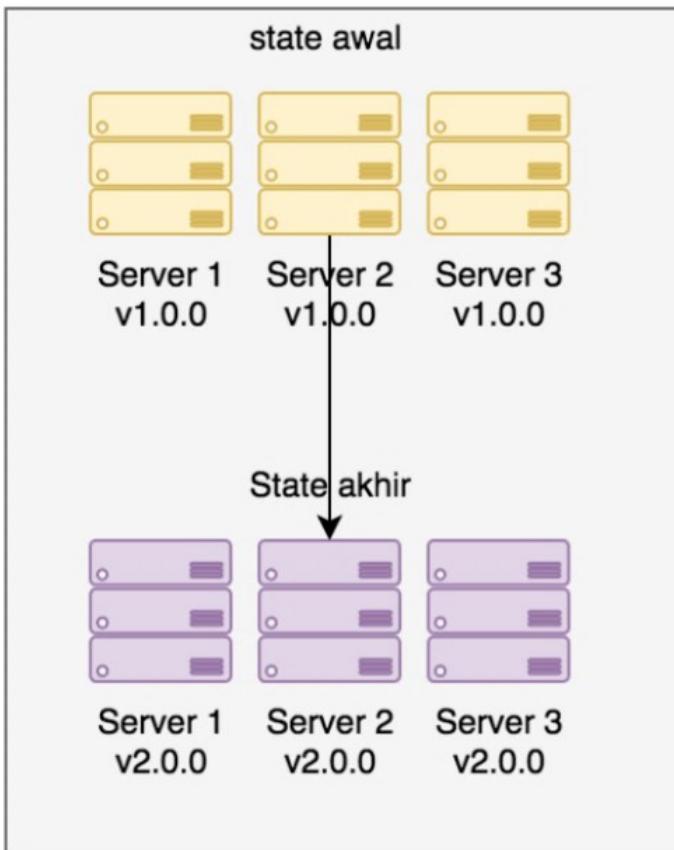
# Strategi Deployment

- ❖ Big-Bang Deployment Strategy atau sering disebut Replace Deployment Strategy
- ❖ Rollout Deployment Strategy
- ❖ Blue/Green Deployment Strategy
- ❖ Canary Deployment Strategy





# Big-Bang/Replace Deployment Strategy



Kelebihan:

- Mudah di-implementasikan. Cara klasik, tinggal replace.
- Perubahan kepada sistem langsung 100% secara instan.

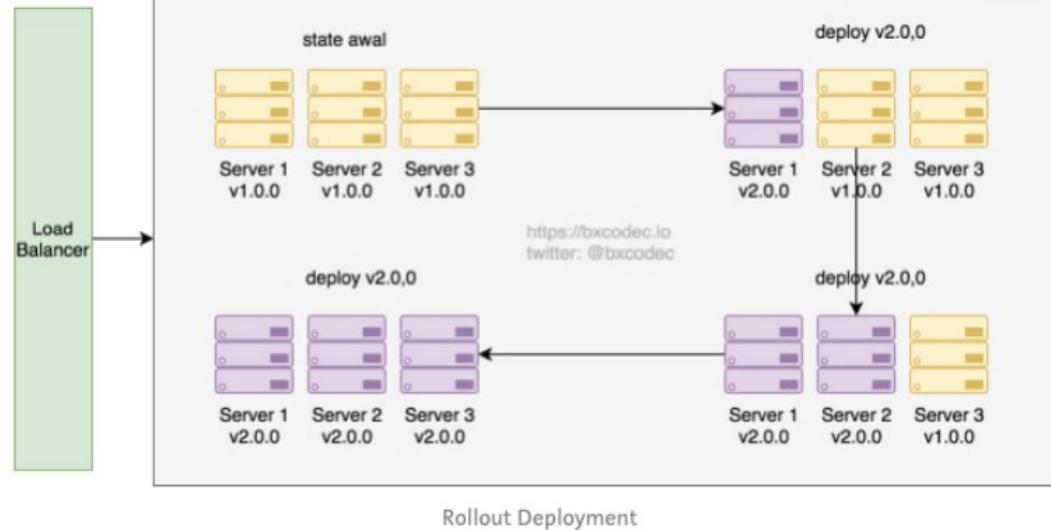
Kekurangan

- Terlalu beresiko, rata-rata *downtime* cukup lama.





# Rollout Deployment Strategy



Kelebihan:

- Lebih aman dan less *downtime* dari versi sebelumnya

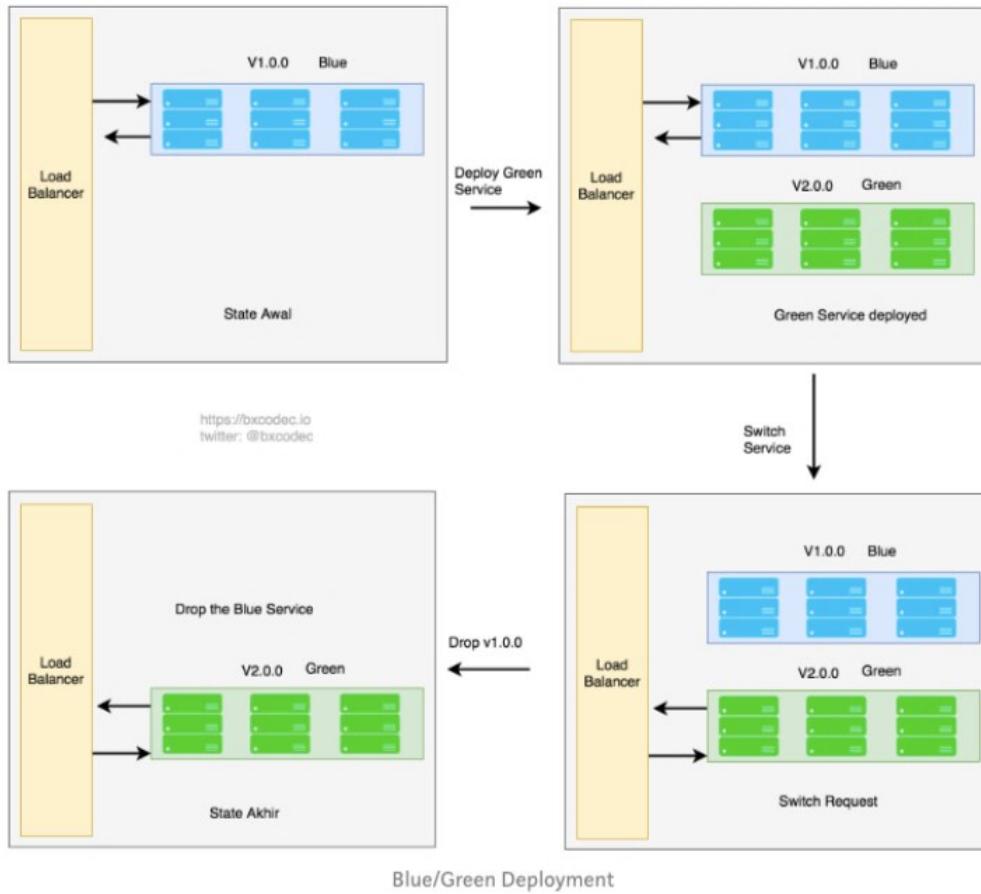
Kekurangan

- Akan ada 2 versi aplikasi berjalan secara bareng sampai semua server terdeploy, dan bisa membuat bingung.
- Karena sifatnya perlahan satu persatu, untuk *deployment* dan *rollback* lebih lama dari yang Bigbang, karena prosesnya perlahan-lahan sampai semua server terkena efeknya.
- Tidak ada kontrol *request*. Server yang baru ter-*deploy* dengan aplikasi versi baru, langsung mendapat *request* yang sama banyaknya dengan server yang lain.





# Blue/Green Deployment Strategy



Kelebihan:

- Perubahan sangat cepat, sekali *switch service* langsung berubah 100%.
- Tidak ada issue beda versi pada *service* seperti yang terjadi pada Rollout Deployment.

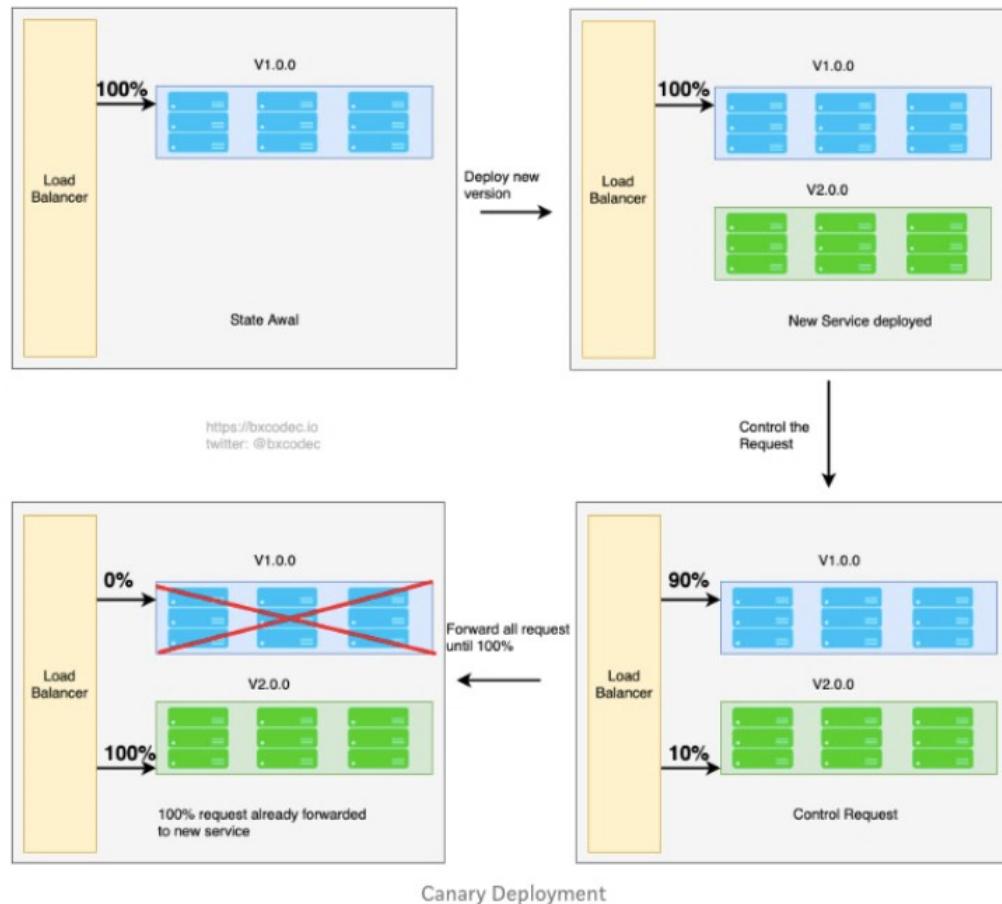
Kekurangan:

- *Resource* yang dibutuhkan lebih banyak. Karena untuk setiap *deployment* kita harus menyediakan *service* yang serupa *environmentnya* dengan yang sedang berjalan di *production*.
- Testing harus benar-benar sangat diprioritaskan sebelum di *switch*, aplikasi harus kita pastikan aman dari *request* yang tiba-tiba banyak.





# Canary Deployment Strategy



Kelebihan:

- Cukup aman
- Mudah untuk *rollback* jika terjadi error/bug, tanpa berimbang kesemua user

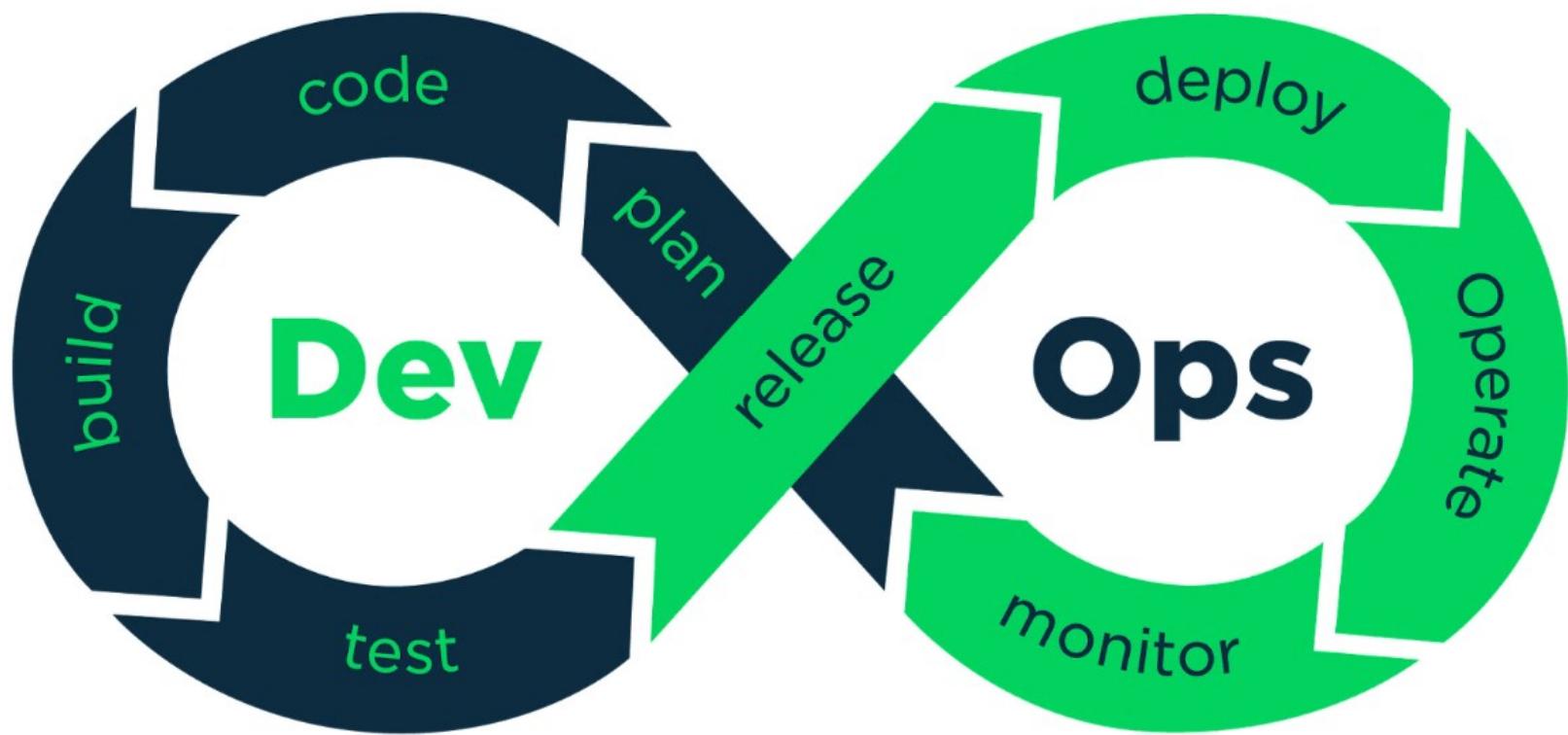
Kekurangan:

- Untuk mencapai 100% cukup lama dibanding dengan Blue/Green deployment. Dengan Blue/Green deployment, aplikasi langsung 100% terdeploy keseluruh user.



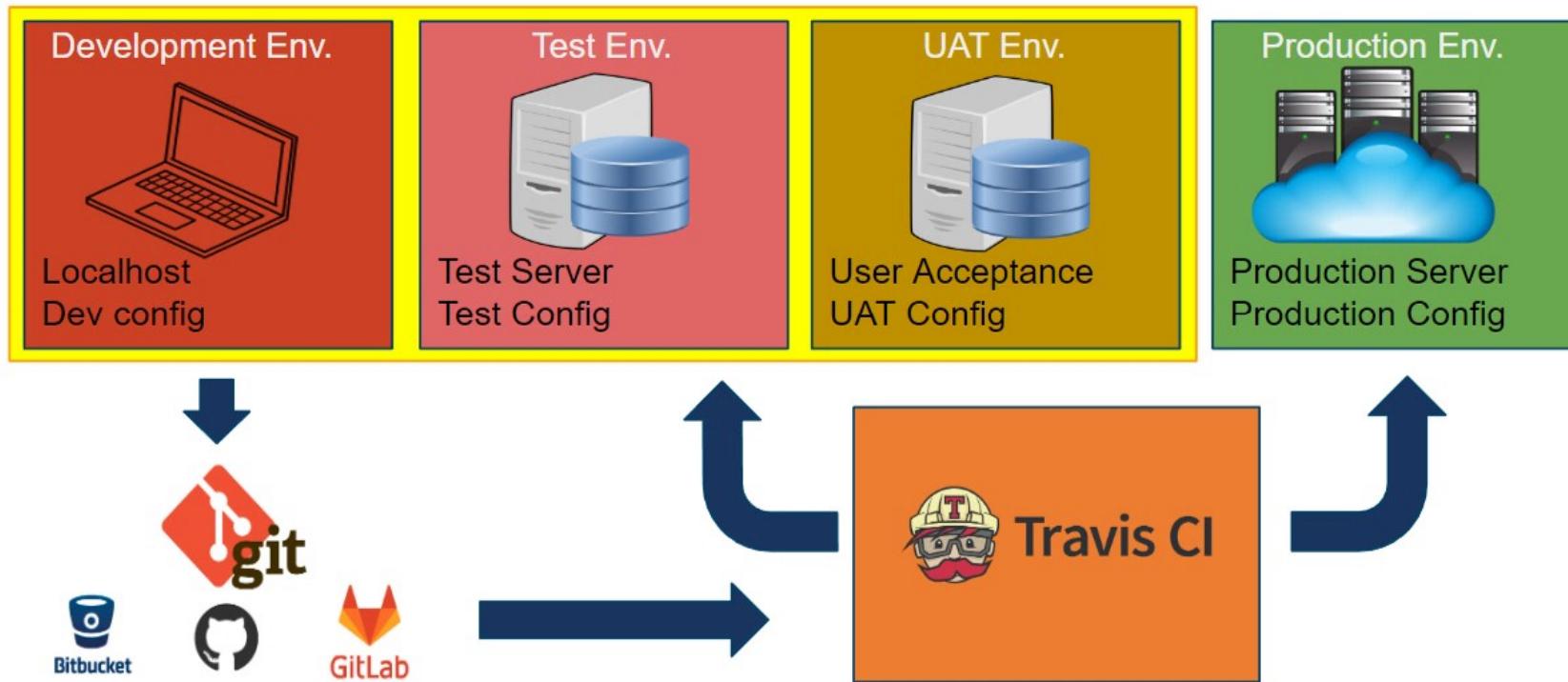


## Simple Dev-Ops Cycle



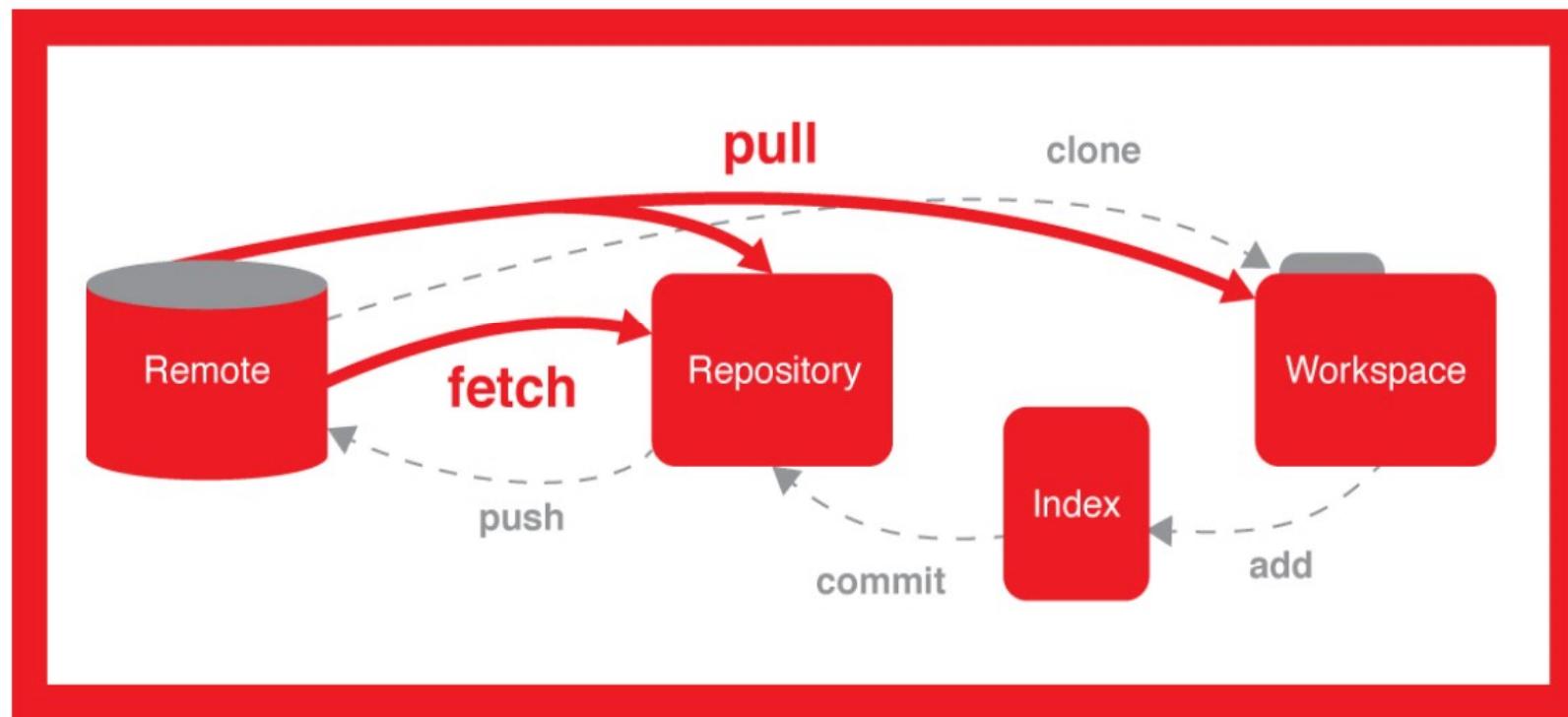


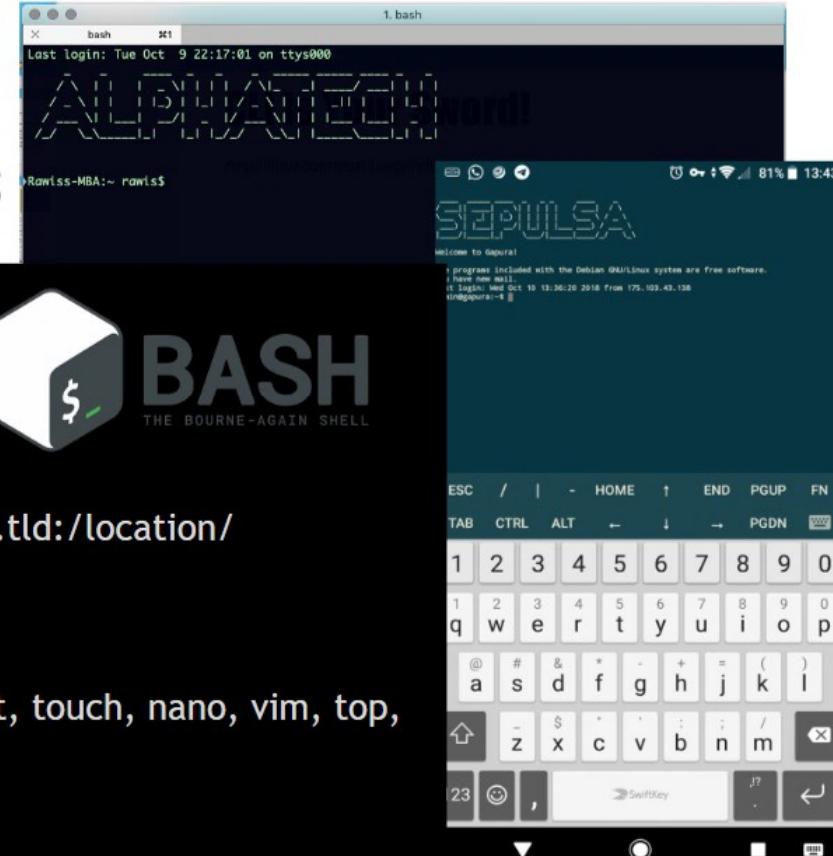
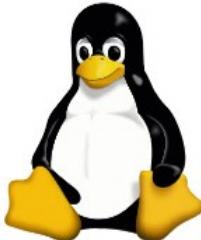
# Simple Deployment Process





# GIT Process





# CLI & SHELL Scripts

<http://linuxcommand.org/index.php>



Example:

SSH (ssh -i public.pem user@address.tld)

SCP (scp -i public.pem source.file user@address.tld:/location/

RSYNC (rsync options source destination)

(Your Daily Basic Commands)

su, cd, ls, mkdir, cp, mv, chmod, chown, rm, cat, touch, nano, vim, top, ping, telnet, wget, scp, ssh, history, etc...

# AWS EC2 & RDS

**EC2**



Services ▾



Search for services, features, marketplace products, and docs



# AWS Management Console

## AWS services

### ▼ Recently visited services



EC2

### ▼ All services



Compute

EC2

Lightsail

Lambda



Quantum Technologies

Amazon Braket



Management & Governance



Sec

Con

IAM

Resc



AWS Services ▾  rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

New EC2 Experience  
Tell us what you think X

**EC2 Dashboard**

- EC2 Global View
- Events
- Tags
- Limits

**Instances**

- Instances New
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances New
- Dedicated Hosts
- Capacity Reservations

**Images**

- AMIs

**Elastic Block Store**

- Volumes

**Resources**

You are using the following Amazon EC2 resources in the US East (Ohio) Region:

Instances (running)	0	Dedicated Hosts	0
Elastic IPs	0	Instances	0
Key pairs	1	Load balancers	0
Placement groups	0	Security groups	2
Snapshots	0	Volumes	0

*(i)* Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. [Learn more](#) X

**Launch instance**

To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.

**Launch Instance** ▼ **Migrate a server** ▼

Note: Your instances will launch in the US East (Ohio) Region

**Account attributes**

- Supported platforms [?]
  - VPC
- Default VPC [?]  
vpc-558b453e
- Settings
- EBS encryption
- Zones
- EC2 Serial Console
- Default credit specification
- Console experiments

**Explore AWS**

**Save up to 90% on EC2 with Spot Instances**  
Optimize price-performance by combining EC2 purchase options in a single EC2 ASG. [Learn more](#) [?]

**Save Up to 45% on ML Inference**  
EC2 Inf1 instances provide high performance and lowest cost ML inference in the cloud.



 Services ▾ Search for services, features, marketplace products, and docs [Option+S] rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

1. Choose AMI   2. Choose Instance Type   3. Configure Instance   4. Add Storage   5. Add Tags   6. Configure Security Group   7. Review

## Step 1: Choose an Amazon Machine Image (AMI)

[Cancel and Exit](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Search for an AMI by entering a search term e.g. "Windows" Search by Systems Manager parameter

Quick Start		1 to 44 of 44 AMIs	
<input type="checkbox"/> My AMIs	 <b>Amazon Linux 2 AMI (HVM), SSD Volume Type</b> - ami-00dfe2c7ce89a450b (64-bit x86) / ami-031dea1a744251b51 (64-bit Arm) <span>Select</span>	<input checked="" type="radio"/> 64-bit (x86)	<input type="radio"/> 64-bit (Arm)
<input type="checkbox"/> AWS Marketplace	Amazon Linux <span>Free tier eligible</span> Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is approaching end of life on December 31, 2020 and has been removed from this wizard.	Root device type: ebs Virtualization type: hvm ENA Enabled: Yes	
<input type="checkbox"/> Community AMIs	 <b>macOS Big Sur 11.6</b> - ami-02e801fdc189297e0	<span>Select</span> 64-bit (Mac)	
<input type="checkbox"/> Free tier only <span>i</span>			

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

## Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance families ▾ Current generation ▾ Show/Hide Columns

Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, -, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	t2	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.xlarge	4	16	EBS only	-	Moderate	Yes
<input type="checkbox"/>	t2	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
<input type="checkbox"/>	t3	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
<input type="checkbox"/>	t3	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes
<input type="checkbox"/>	t3	t3.small	2	2	EBS only	Yes	Up to 5 Gigabit	Yes

Cancel Previous Review and Launch Next: Configure Instance Details

AWS Services ▾ Search for services, features, marketplace products, and docs [Option+S] rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 7: Review Instance Launch

Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.  
You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

**AMI Details** [Edit AMI](#)

 **Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-00dfe2c7ce89a450b**  
Free tier eligible Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is a...  
Root Device Type: ebs Virtualization type: hvm

**Instance Type** [Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	-	1	1	EBS only	-	Low to Moderate

**Security Groups** [Edit security groups](#)

**Security group name** launch-wizard-1  
**Description** launch-wizard-1 created 2021-09-30T12:09:58.029+07:00

Type <small>i</small>	Protocol <small>i</small>	Port Range <small>i</small>	Source <small>i</small>	Description <small>i</small>
SSH	TCP	22	0.0.0.0/0	

---

1. Choose AMI    2. Choose Instance Type    3. Configure Instance    4. Add Storage    5. Add Tags    **6. Configure Security Group**    7. Review

## Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group:  Create a new security group

Select an existing security group

Security group name:

Description:

Type <small>i</small>	Protocol <small>i</small>	Port Range <small>i</small>	Source <small>i</small>	Description <small>i</small>
SSH	TCP	22	Custom <input type="text" value="0.0.0.0/0"/> <input type="button" value="X"/>	e.g. SSH for Admin Desktop

**Add Rule**



### Warning

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

---





Services ▾

Search for services, features, marketplace products, and docs

[Option+S]



rizkykurniawan @ alterra-academy ▾

Ohio ▾

Support ▾

[1. Choose AMI](#)   [2. Choose Instance Type](#)   [3. Configure Instance](#)   [4. Add Storage](#)   [5. Add Tags](#)   **6. Configure Security Group**   [7. Review](#)

## Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group:  Create a new security group

Select an existing security group

Security group name:

Description:

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	Description ⓘ	⋮
SSH	TCP	22	Custom ⏺ 0.0.0.0/0	e.g. SSH for Admin Desktop	
HTTP	TCP	80	Custom ⏺ 0.0.0.0/0, ::/0	e.g. SSH for Admin Desktop	

Add Rule



### Warning

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Cancel

Previous

Review and Launch



us-east-2.console.aws.amazon.com/ec2/v2/home#region=us-east-2#LaunchInstanceWizard:

Services ▾ Search for services, features, marketplace products, and docs [Option+S] rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 7: Review Instance Launch

Free tier eligible Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, GLIBC 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is a...

Root Device Type: ebs Virtualization type: hvm

▼ Instance Type Edit instance type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	-	1	1	EBS only	-	Low to Moderate

▼ Security Groups Edit security groups

Security group name: launch-wizard-1  
 Description: launch-wizard-1 created 2021-09-30T12:09:57.980+07:00

Type <span>i</span>	Protocol <span>i</span>	Port Range <span>i</span>	Source <span>i</span>	Description <span>i</span>
SSH	TCP	22	0.0.0.0/0	
HTTP	TCP	80	0.0.0.0/0	
HTTP	TCP	80	::/0	

▼ Instance Details Edit instance details

▼ Storage Edit storage

▼ Tags Edit tags

Cancel Previous Launch



aws Services ▾ Search for services, features, marketplace products, and docs [Option+S] rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

**⚠ Improve your instances' security. Your security group, launch-wizard-1, is open to the world.**

Your instances may be accessible from any IP address. You can also open additional ports in your security group.

**Select an existing key pair or create a new key pair**

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance. Amazon EC2 supports ED25519 and RSA key pair types.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair: **alterra-platform | RSA**

I acknowledge that I have access to the corresponding private key file, and that without this file, I won't be able to log into my instance.

**Cancel** **Launch Instances**

**AMI Details**

**Amazon Linux 2 AMI (HVM), SSD Volume** Free tier eligible

Amazon Linux 2 comes with five years support packages through extras. This AMI is the standard for most AWS services.

Root Device Type: ebs Virtualization type: hvm

**Instance Type**

Instance Type	ECUs	vCPUs
t2.micro	-	1

**Security Groups**

Security group name: **launch-wizard-1**  
Description: **launch-wizard-1 created 2021-09-30T12:09:57.980+07:00**

Type i Protocol i Port Range i Source i Description i

**Cancel** **Previous** **Launch**

Your security group, launch-wizard-1, is open to the world.

## Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance. Amazon EC2 supports ED25519 and RSA key pair types.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Create a new key pair 

**Key pair type**

RSA  ED25519

**Key pair name**

alterra\_academy.aws

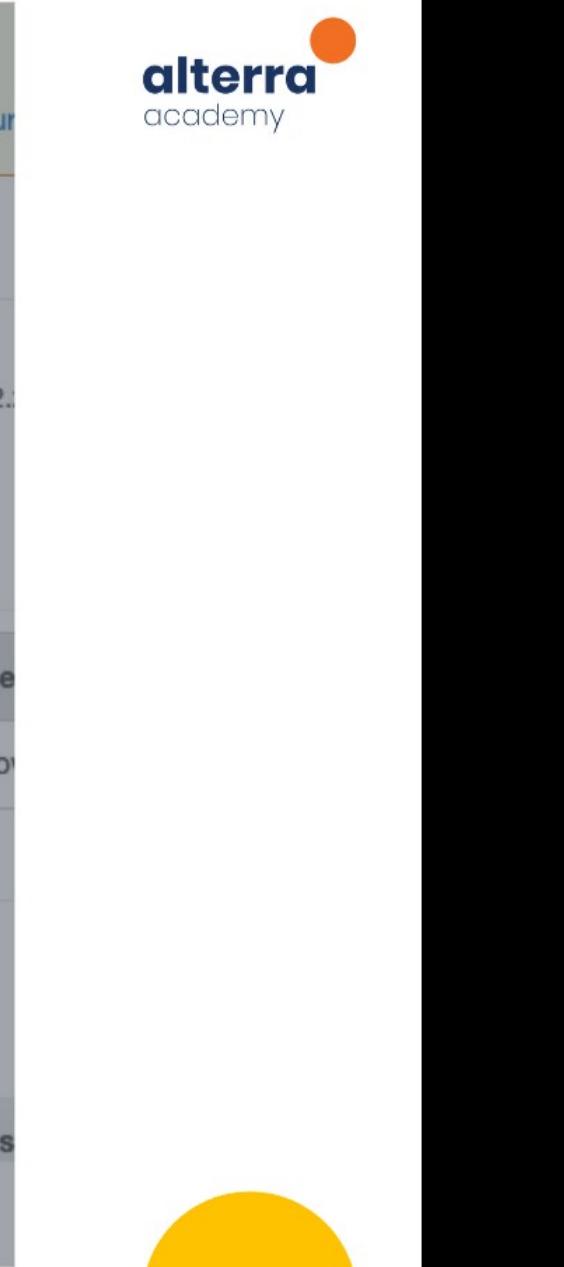
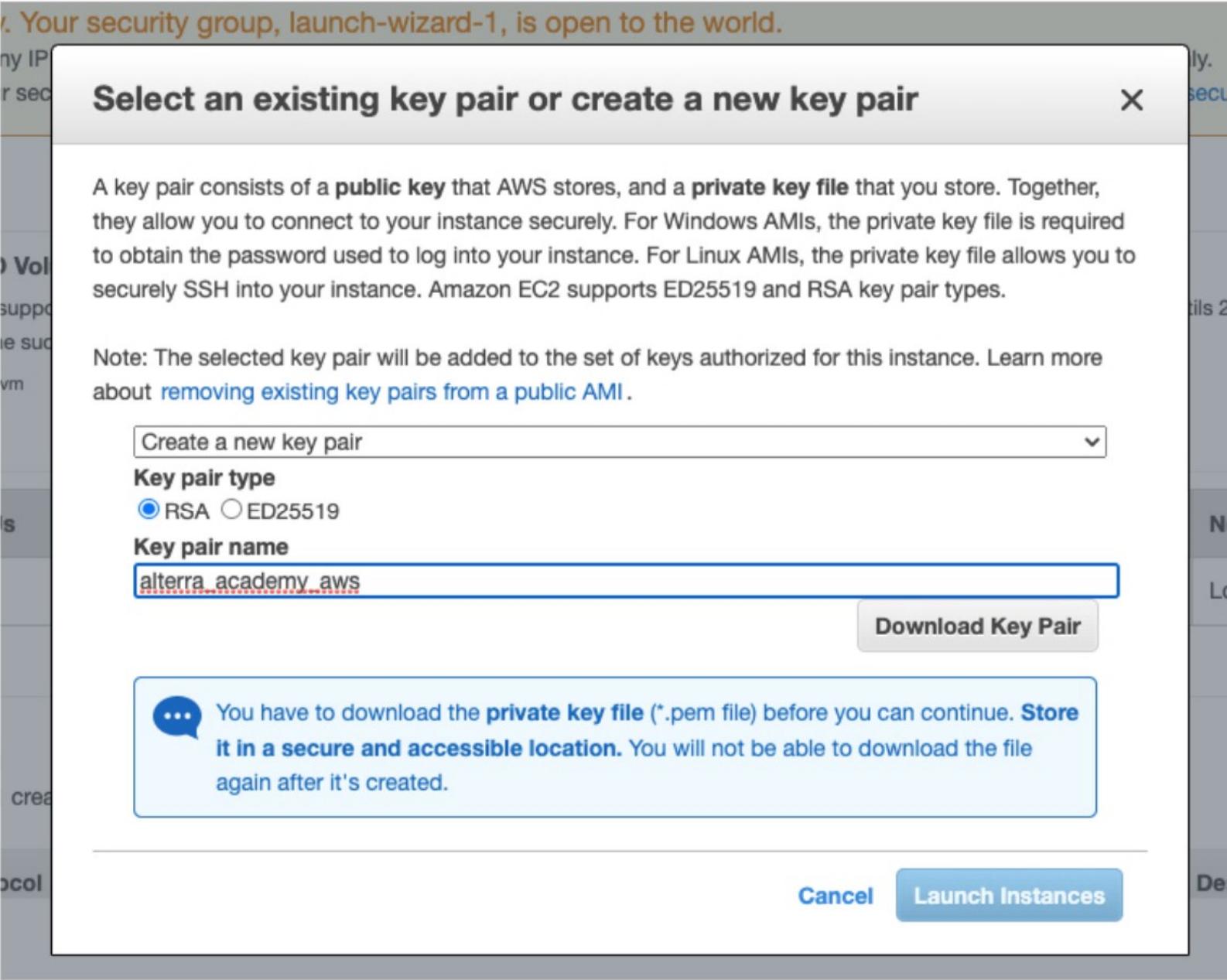
**Download Key Pair**



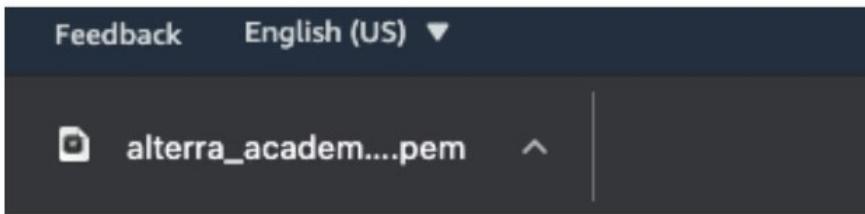
You have to download the **private key file** (\*.pem file) before you can continue. **Store it in a secure and accessible location**. You will not be able to download the file again after it's created.

**Cancel**

**Launch Instances**



ly.  
secur  
tils 2.  
  
Ne  
Loc  
Des



**RDS**

The screenshot shows the AWS Management Console interface. At the top, there is a dark blue header bar with the AWS logo, a "Services" dropdown, a search bar containing the text "rds", and user information "rizkykurniawan @ alterra-academy". Below the header, a sidebar on the left lists various AWS services: "New E", "EC2 Dash", "EC2 Global", "Events", and "Tags". The "Services" section is expanded, showing "Services (4)", "Features (23)", "Documentation (46,833)", and "Knowledge Articles (30)". The main content area displays search results for "rds", with a heading "Search results for 'rds'" and a "Services" section. Under "Services", there is a card for "RDS" (Managed Relational Database Service). To the right of the search results, there is a sidebar titled "Account attributes" which includes sections for "Supported platforms" (listing "VPC") and "Default VPC" (listing "vpc-558b453e").

aws Services ▾

Search for services, features, marketplace products, and docs [Option+S]

rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

**Amazon RDS** X

**Dashboard**

Databases

Query Editor

Performance Insights

Snapshots

Automated backups

Reserved instances

Proxies

Subnet groups

Parameter groups

Option groups

Events

Event subscriptions

Recommendations

Certificate update

Snapshots (0) Custom (0/20)

Manual (0/100) Subnet groups (0/50)

Automated (0) Supported platforms VPC

Recent events (0) Default network vpc-558b453e

Event subscriptions (0/20)

**Create database**

Amazon Relational Database Service (RDS) makes it easy to set up, operate, and scale a relational database in the cloud.

Restore from S3 Create database

Note: your DB instances will launch in the US East (Ohio) region

**Service health**

View service health dashboard

Current status Details

Amazon Relational Database Service (Ohio) Service is operating normally

content to an Amazon RDS for SQL Server instance using a PowerShell module. [Learn more](#)

**Time-Series Tables in PostgreSQL**  
Step-by-step guide to design high-performance time series data tables on Amazon RDS for PostgreSQL. [Learn more](#)

**Implementing Cross-Region DR**  
Learn how to set up Cross-Region disaster recovery (DR) for Aurora PostgreSQL using an Aurora global database spanning multiple Regions. [Learn more](#)

**Additional information**

Getting started with RDS  
Overview and features  
Documentation  
Articles and tutorials  
Data import guide for MySQL  
Data import guide for Oracle  
Data import guide for SQL Server  
New RDS feature announcements

us-east-2.console.aws.amazon.com/rds/home?region=us-east-2#launch-dbinstance:gdb=false;s3-import=false

Services ▾  [Option+S] rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

RDS > Create database

## Create database

**Choose a database creation method** Info

**Standard create**  
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

**Easy create**  
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

**Engine options**

**Engine type** Info

Amazon Aurora 

MySQL 

MariaDB 

PostgreSQL 

Oracle 

Microsoft SQL Server 

aws Services ▾ Search for services, features, marketplace products, and docs [Option+S] ✉️ 🔍 rizkykurniawan @ alterra-academy ▾ Ohio ▾ Support ▾

Edition  MySQL Community

**Known issues/limitations**  
Review the [Known issues/limitations](#)  to learn about potential compatibility issues with specific database versions.

Version

**Templates**  
Choose a sample template to meet your use case.

**Production**  
Use defaults for high availability and fast, consistent performance.

**Dev/Test**  
This instance is intended for development use outside of a production environment.

**Free tier**  
Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS.  
[Info](#)





The screenshot shows the AWS RDS 'Create DB Instance' wizard, step 2: Set instance identifier and credentials. The 'Settings' tab is selected.

**DB instance identifier:** [Info](#) **alterra\_academy**  
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

**Credentials Settings**

**Master username:** [Info](#) **root**  
Type a login ID for the master user of your DB instance.  
1 to 16 alphanumeric characters. First character must be a letter  
 **Auto generate a password**  
Amazon RDS can generate a password for you, or you can specify your own password

**Master password:** [Info](#) **\*\*\*\*\***  
Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), ' (single quote), " (double quote) and @ (at sign).

**Confirm password:** [Info](#) **\*\*\*\*\***

AWS navigation bar: Services ▾, Search for services, features, marketplace products, and docs [Option+S], Notifications, rizkykurniawan @ alterra-academy ▾, Ohio ▾, Support ▾.

≡

### DB instance class

DB instance class [Info](#)

- Standard classes (includes m classes)
- Memory optimized classes (includes r and x classes)
- Burstable classes (includes t classes)

db.t2.micro ▾  
1 vCPUs   1 GiB RAM   Not EBS Optimized

Include previous generation classes



## Storage

Storage type [Info](#)

General Purpose SSD (gp2)

Allocated storage

20 GiB

(Minimum: 20 GiB. Maximum: 16,384 GiB) Higher allocated storage [may improve](#) IOPS performance.

Storage autoscaling [Info](#)

Provides dynamic scaling support for your database's storage based on your application's needs.

Enable storage autoscaling

Enabling this feature will allow the storage to increase once the specified threshold is exceeded.

Maximum storage threshold [Info](#)

Charges will apply when your database autoscales to the specified threshold

1000 GiB

Minimum: 21 GiB. Maximum: 16,384 GiB



## Connectivity

C

**Virtual private cloud (VPC) [Info](#)**  
VPC that defines the virtual networking environment for this DB instance.

Default VPC (vpc-558b453e) ▾

Only VPCs with a corresponding DB subnet group are listed.

ⓘ After a database is created, you can't change its VPC.

**Subnet group [Info](#)**  
DB subnet group that defines which subnets and IP ranges the DB instance can use in the VPC you selected.

default ▾

**Public access [Info](#)**

**Yes**  
Amazon EC2 instances and devices outside the VPC can connect to your database. Choose one or more VPC security groups that specify which EC2 instances and devices inside the VPC can connect to the database.

**No**  
RDS will not assign a public IP address to the database. Only Amazon EC2 instances and devices inside the VPC can connect to your database.



**VPC security group**

Choose a VPC security group to allow access to your database. Ensure that the security group rules allow the appropriate incoming traffic.

**Choose existing**

Choose existing VPC security groups

**Create new**

Create new VPC security group

**Existing VPC security groups**

Choose VPC security groups ▾

launch-wizard-1 

**Availability Zone** 

No preference ▾

▼ **Additional configuration**

**Database port** 

TCP/IP port that the database will use for application connections.

3306

## Database authentication

Database authentication options [Info](#)

**Password authentication**

Authenticates using database passwords.

**Password and IAM database authentication**

Authenticates using the database password and user credentials through AWS IAM users and roles.

**Password and Kerberos authentication**

Choose a directory in which you want to allow authorized users to authenticate with this DB instance using Kerberos Authentication.



#### ► Additional configuration

Database options, backup enabled, backtrack disabled, Enhanced Monitoring disabled, maintenance, CloudWatch Logs, delete protection disabled

#### Estimated monthly costs

The Amazon RDS Free Tier is available to you for 12 months. Each calendar month, the free tier will allow you to use the Amazon RDS resources listed below for free:

- 750 hrs of Amazon RDS in a Single-AZ db.t2.micro Instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.

[Learn more about AWS Free Tier.](#) 

When your free usage expires or if your application use exceeds the free usage tiers, you simply pay standard, pay-as-you-go service rates as described in the [Amazon RDS Pricing page](#). 

 You are responsible for ensuring that you have all of the necessary rights for any third-party products or services that you use with AWS services.

Cancel

Create database



## Settings

**DB instance identifier** [Info](#)  
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

altadb

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

**▼ Credentials Settings**

**Master username** [Info](#)  
Type a login ID for the master user of your DB instance.

root

1 to 16 alphanumeric characters. First character must be a letter

**Auto generate a password**  
Amazon RDS can generate a password for you, or you can specify your own password

**Master password** [Info](#)  
.....

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), '(single quote), "(double quote) and @ (at sign).

**Confirm password** [Info](#)  
.....



aws Services ▾

Search for services, features, marketplace products, and docs [Option+S]

rizkykumiawan @ alterra-academy ▾ Ohio ▾ Support ▾

**Amazon RDS** ×

**C Creating database altadb**  
Your database might take a few minutes to launch.

View credential details ×

RDS > Databases

**Databases**

Group resources C Modify Actions ▾ Restore from S3 Create database

Filter databases < 1 > ⚙

DB identifier	Role	Engine	Region & AZ	Size	Status
altadb	Instance	MySQL Community	-	db.t2.micro	Creating

Dashboard

**Databases**

Query Editor

Performance Insights

Snapshots

Automated backups

Reserved instances

Proxies

Subnet groups

Parameter groups

Option groups

Events

Event subscriptions

Recommendations

Certificate update



us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#Instances:instanceState=running

Services ▾

New EC2 Experience Tell us what you think

EC2 Dashboard

EC2 Global View

Events

Tags

Limits

Instances

- Instances New
- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances New
- Dedicated Hosts
- Capacity Reservations

Images

- AMIs

Elastic Block Store

- Volumes
- Snapshots

Lifecycle Manager

Instances (1) Info

Filter Instances

Instance state: running X

Clear filters

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Pu
-	i-0ef92d0bdc803cae7	Running	t2.micro	2/2 checks passed	No alarms	us-east-2b	ec

Select an instance above

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#InstanceDetails:instanceId=i-0ef92d0bdc803cae7

New EC2 Experience Tell us what you think

EC2 Instances i-0ef92d0bdc803cae7

Instance summary for i-0ef92d0bdc803cae7

Updated less than a minute ago

Instance ID	Public IPv4 address	Private IPv4 addresses
i-0ef92d0bdc803cae7	18.217.140.8   open address	172.31.18.132
IPv6 address	Instance state	Public IPv4 DNS
-	Running	ec2-18-217-140-8.us-east-2.compute.amazonaws.com   open address
Private IPv4 DNS	Instance type	Elastic IP addresses
ip-172-31-18-132.us-east-2.compute.internal	t2.micro	-
VPC ID	AWS Compute Optimizer finding	IAM Role
vpc-558b453e	<b>User:</b> arn:aws:iam::419412945238:user/rizkykurniawan is not authorized to perform: compute-optimizer:GetEnrollmentStatus on resource: * <a href="#">Retry</a>	-
Subnet ID		
subnet-3d361a47		

Details Security Networking Storage Status checks Monitoring Tags

Instance details

Feedback English (US) © 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

AWS Services ▾ Search for services, features, marketplace products, and docs [Option+S]

RDS > Databases > altadb

## Amazon RDS

### altadb

Modify Actions ▾

Summary			
DB Identifier	CPU	Status	Class
altadb	4.50%	Available	db.t2.micro
Role	Current activity	Engine	Region & AZ
Instance	0 Connections	MySQL Community	us-east-2c

Connectivity & security Monitoring Logs & events Configuration Maintenance & backups Tags

### Connectivity & security

Endpoint & port	Networking	Security
Endpoint altadb.chnrwur23unl.us-east-2.rds.amazonaws.com	Availability Zone us-east-2c	VPC security groups launch-wizard-1 (sg-029e6df90508ff628) (active)
Port 3306	VPC <a href="#">vpc-558b453e</a>	Publicly accessible Yes
	Subnet group default-vpc-558b453e	

## Edit inbound rules Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules <small>Info</small>						
Security group rule ID	Type <small>Info</small>	Protocol <small>Info</small>	Port range <small>Info</small>	Source <small>Info</small>	Description - optional <small>Info</small>	
sgr-047cd68d75fa9b329	SSH ▾	TCP	22	Custom ▾	<input type="text"/> Q 0.0.0.0/0 X	<button>Delete</button>
sgr-09943a571558507e8	HTTP ▾	TCP	80	Custom ▾	<input type="text"/> Q 0.0.0.0/0 X	<button>Delete</button>
sgr-0b4d744ae59f53dbc	HTTP ▾	TCP	80	Custom ▾	<input type="text"/> Q ::/0 X	<button>Delete</button>
sgr-0b72a76478153a1f4	MySQL/Aurora ▾	TCP	3306	Custom ▾	<input type="text"/> Q 0.0.0.0/0 X	<button>Delete</button>

[Add rule](#)

[Cancel](#) [Preview changes](#) [Save rules](#)

# **Connection with SSH & Deployment to AWS**



***The Best Way of  
Learning about Anything  
is by Doing***

# TUGAS

2

## Deployment EC2

1. Membuat VM di EC2, dan Implementasi Security Group EC2.
2. Melakukan SSH Remote ke VM di AWS EC2 (Dengan Key) serta dijelaskan key dan password.
3. Deploy your Program to EC2.

# TUGAS

# 3



## Deployment RDS

1. Membuat DB di RDS.
2. Migrate Your Local Data to RDS.
3. Connect Your Application to RDS.

# TUGAS

# 4

## Pointing Domain (Opsional)

1. Pointing Domain ke IP VM EC2.
2. Deploy dan jalankan aplikasi di live environment di AWS yang dapat diakses publik sesuai standar.

# PART III



## Continuous

- Integration
- Delivery
- Deployment



# LEARN

- continuous integration
- continuous delivery
- continuous deployment
- how to CI & CD improve your productivity.



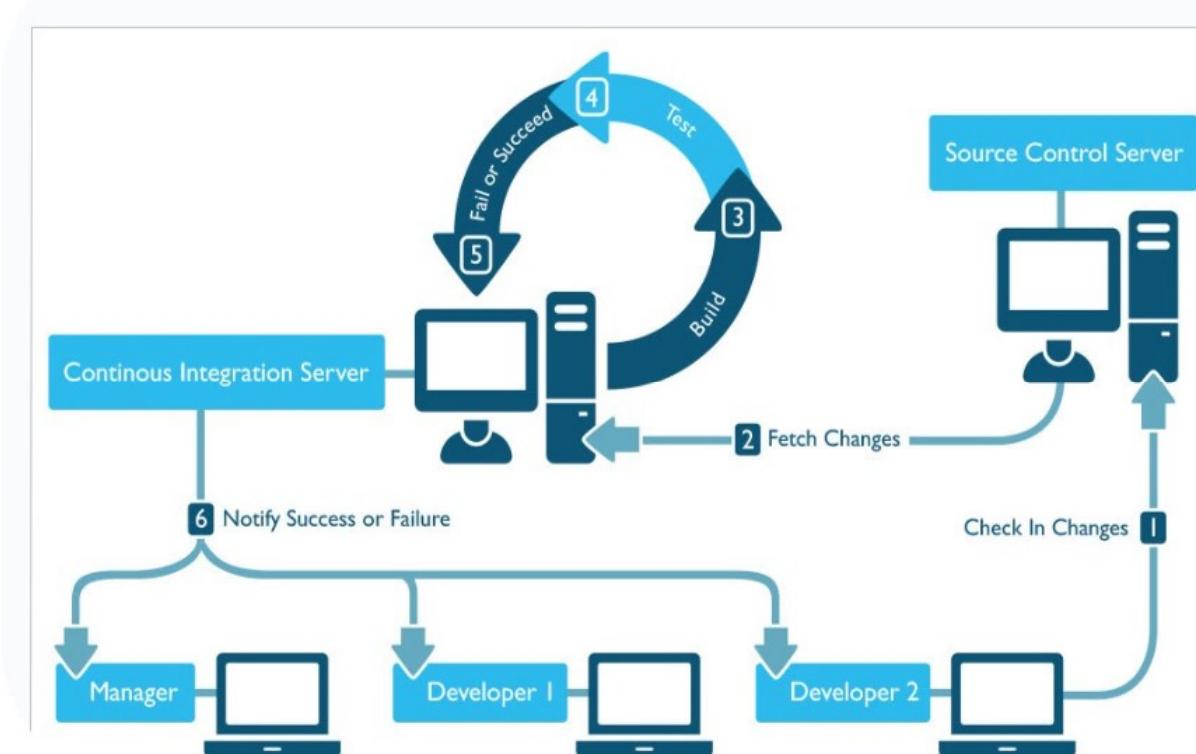
# *Continuous Integration*

is an **automated process**.

It is done in order to **integrate** various codes  
from **different** potential sources  
in order to build it or test it.



# The Cycle





# Continuous Delivery Deployment

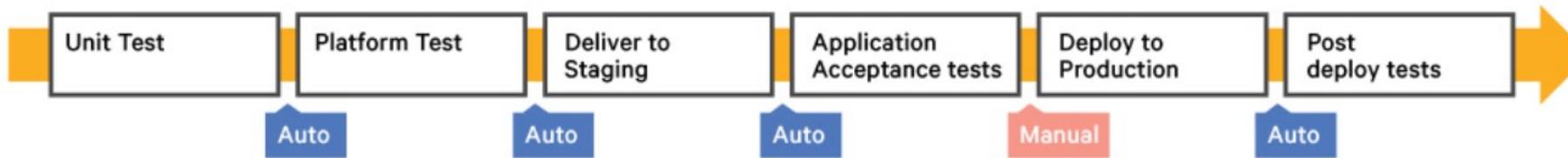
The **continuous deployment** process goes one step further than the **integration** and **delivery** process.

The pipeline of **continuous deployment** automatically **deploys** each and every build that have been **verified**.

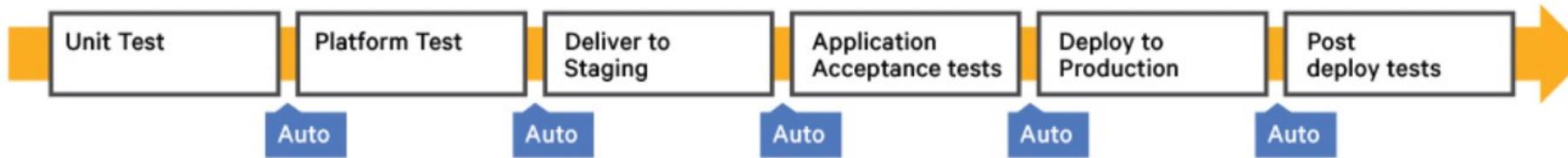


# The Cycle

## Continuous Delivery

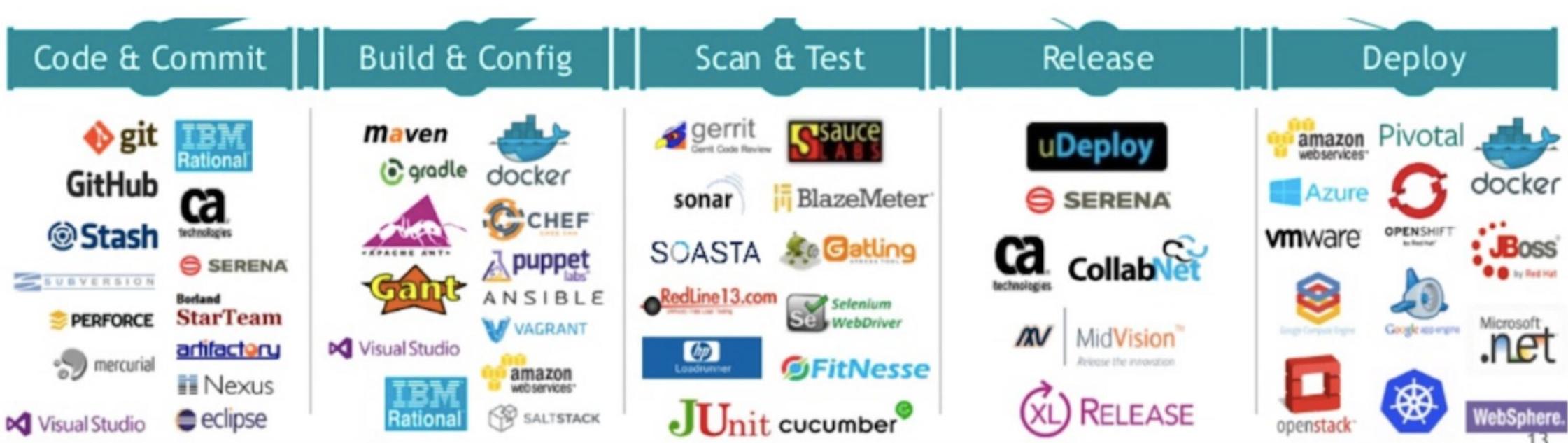


## Continuous Deployment





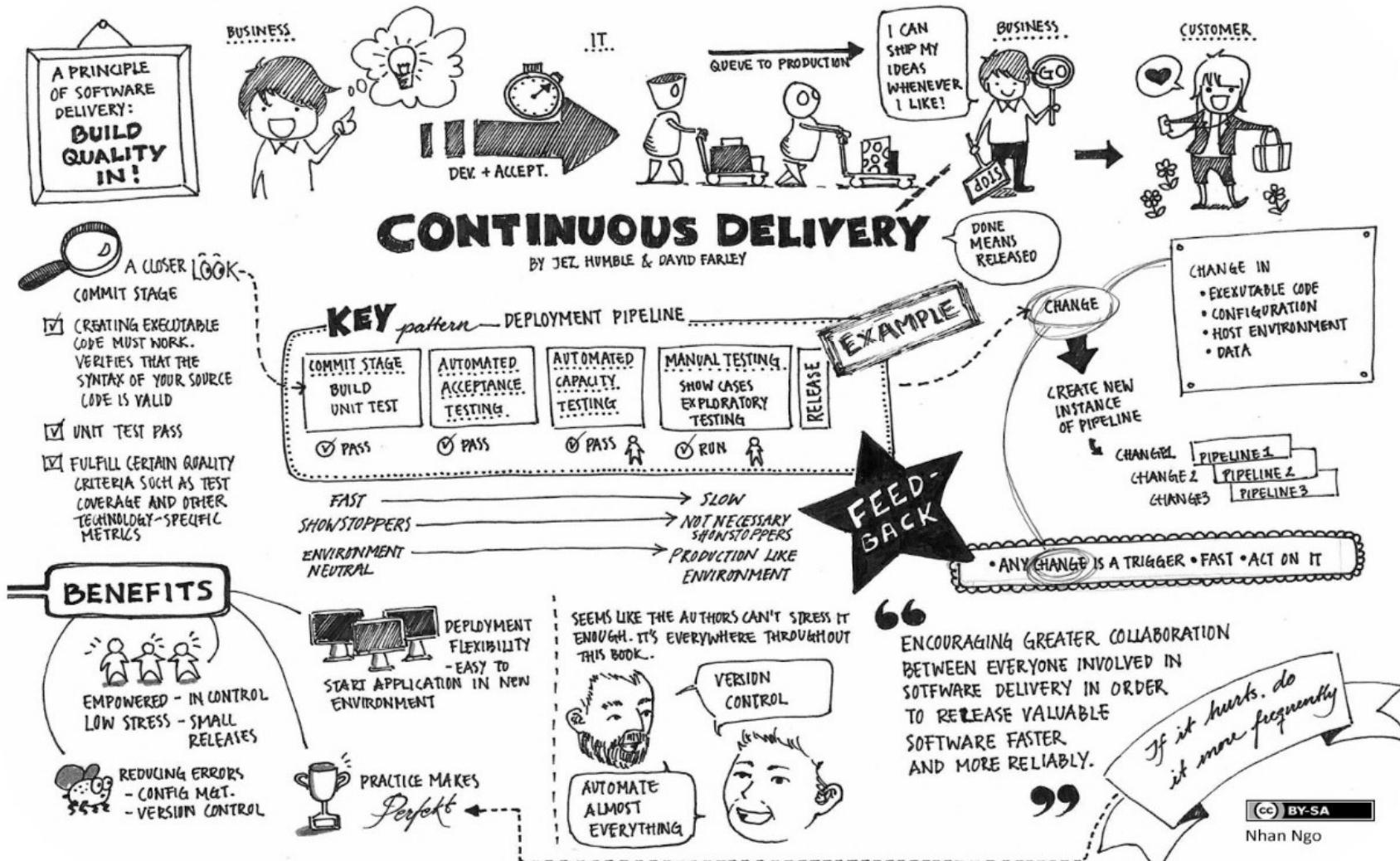
# The Tools



( <https://landscape.cncf.io/> )



# Conclusion



**Automation ?  
Let's do it !**

# TUGAS



## Deployment CI/CD

1. Create CI/CD to automate deployment

<https://github.com/goFrendiAsgard/alta-batch-3-ec2>

# PART IV



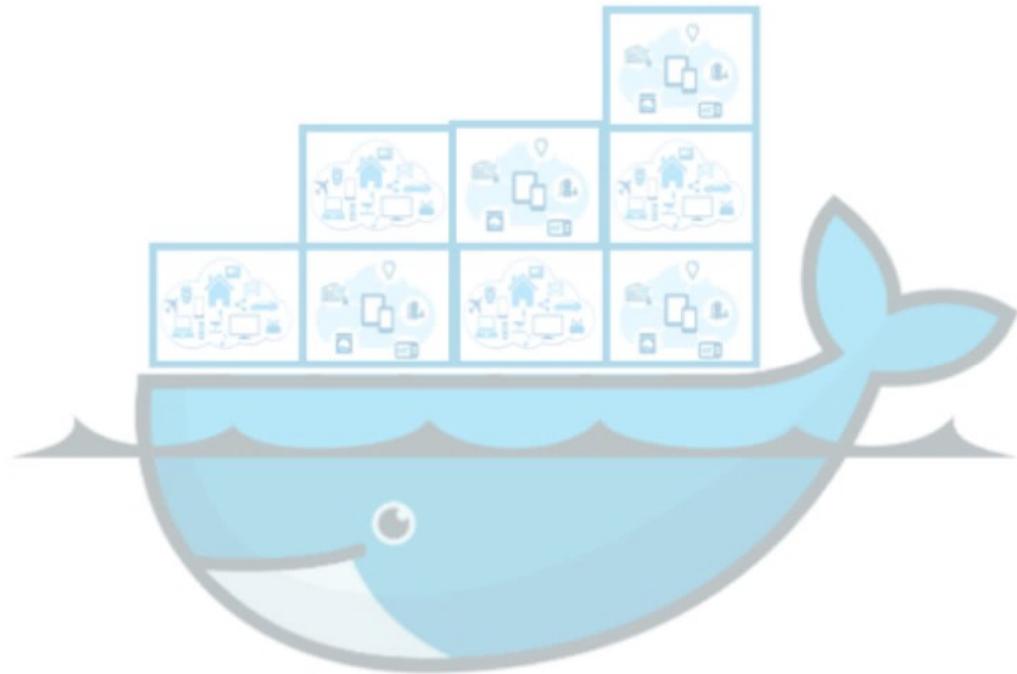
# Kubernetes



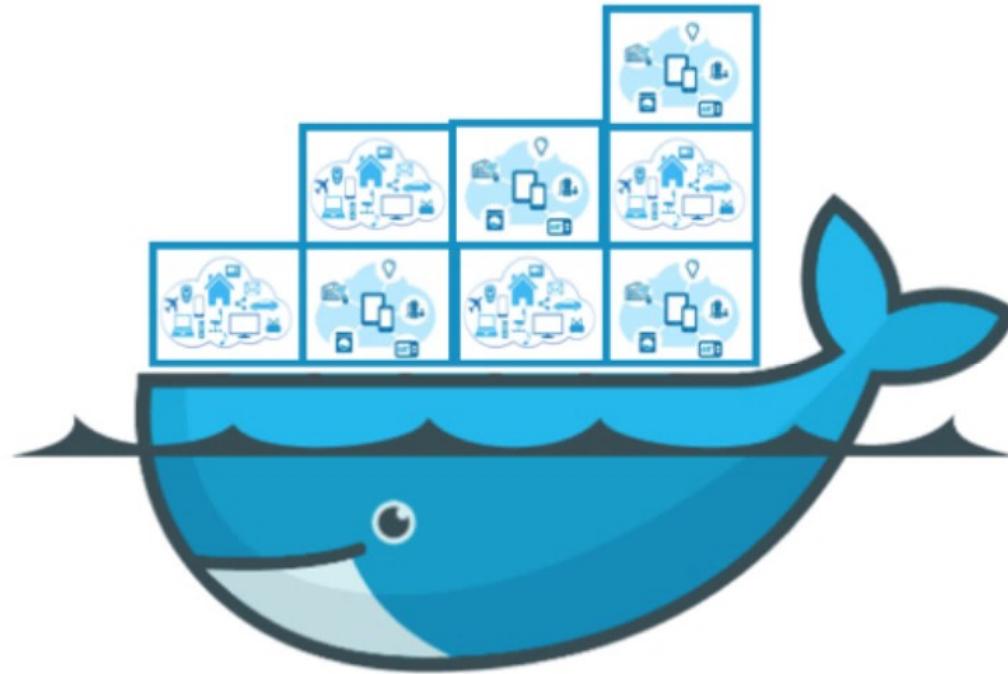
alterra  
academy



<https://en.wikipedia.org/wiki/Kubernetes>



<https://en.wikipedia.org/wiki/Kubernetes>



<https://en.wikipedia.org/wiki/Kubernetes>



## Why we need a container orchestration system?

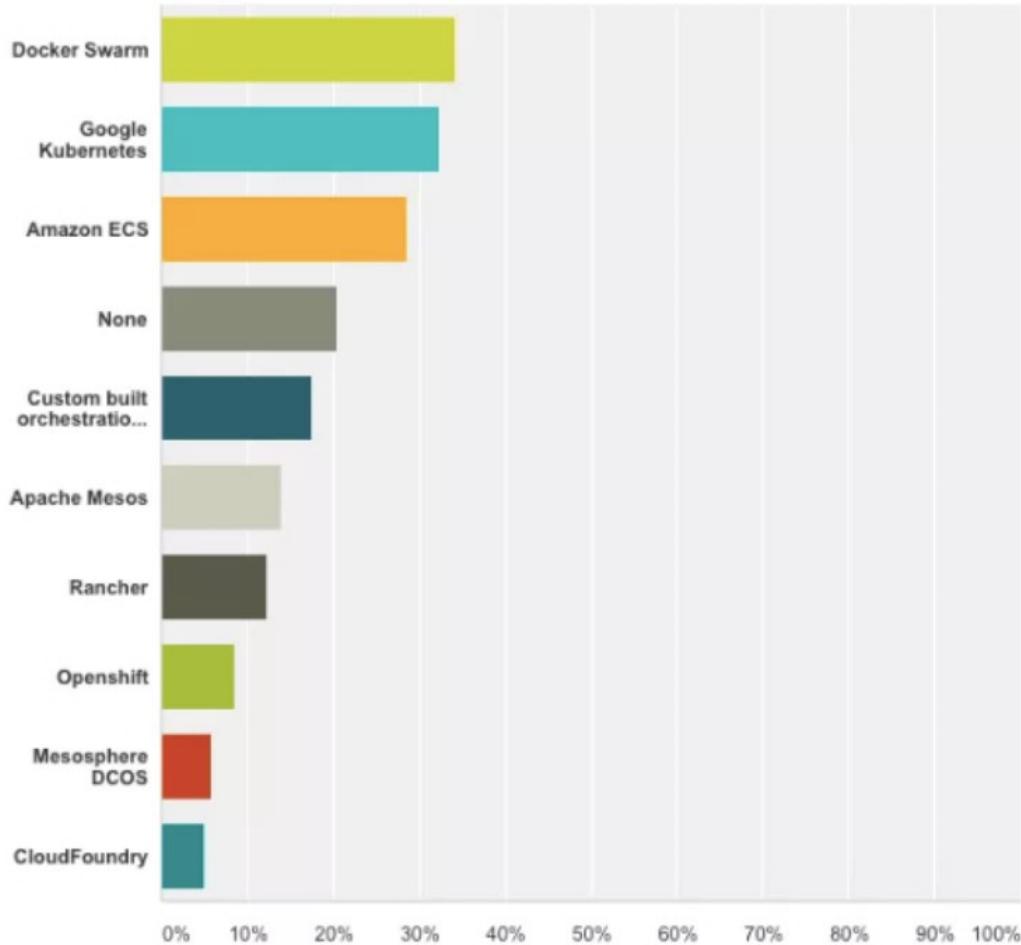
Kubernetes (K8s) is an open-source system for automating deployment, scaling, and management of containerized applications.



<https://en.wikipedia.org/wiki/Kubernetes>



# Why we need a container orchestration system?

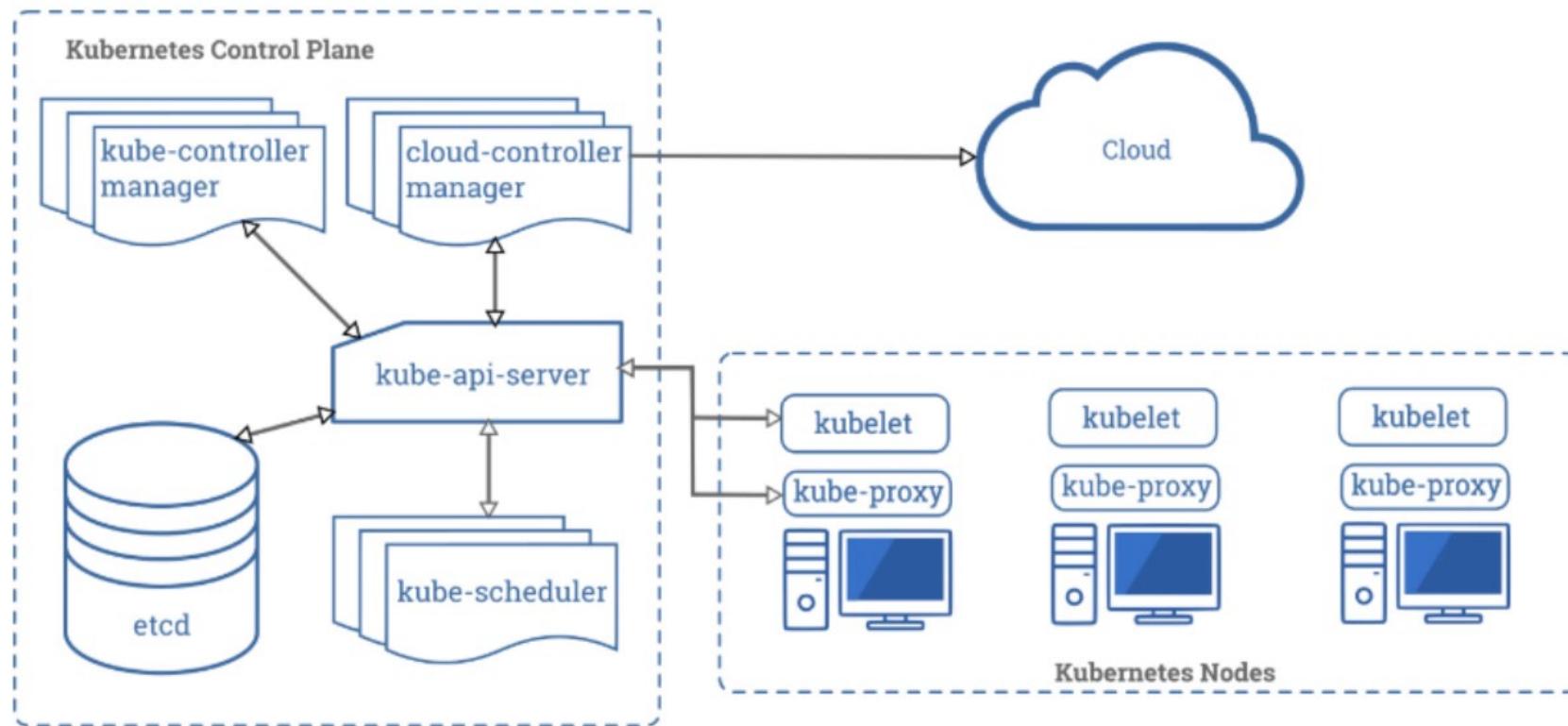


Feb 2018

<https://codingcompiler.com>



# Kubernetes cluster diagram



<https://kubernetes.io/docs/concepts/overview/components/>



## What it can do?

- Service discovery and load balancing.
- Horizontal scaling.
- Automated rollouts and rollbacks.
- Secret and configuration management.



<https://en.wikipedia.org/wiki/Kubernetes>



## What kubernetes is not?

- Does not limit the types of applications supported
- Does not deploy source code and does not build your application.
- Does not provide application-level services, such as middleware.
- Does not dictate logging, monitoring, or alerting solutions.



<https://en.wikipedia.org/wiki/Kubernetes>



# What kubernetes is not?

## Kubectl Apply

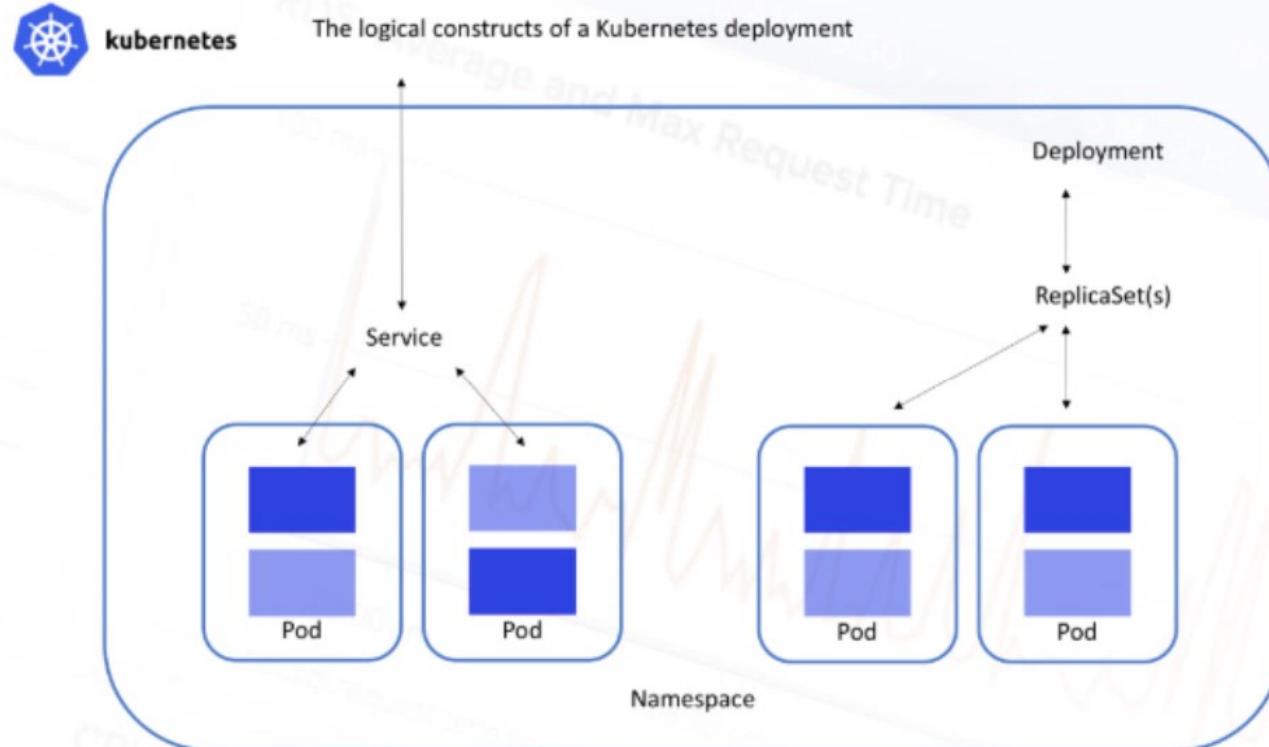
## Kubectl Create

1.	It directly updates in the current live source, only the attributes which are given in the file.	It first deletes the resources and then creates it from the file provided.
2.	The file used in apply can be an incomplete spec	The file used in create should be complete
3.	Apply works only on some properties of the resources	Create works on every property of the resources
4.	You can <u>apply</u> a file that changes only an annotation, without specifying any other properties of the resource.	If you will use the same file with a <u>replace</u> command, the command would fail, due to the missing information.



# Kubernetes workloads

**Namespaces** provide for a scope of Kubernetes resource, carving up your cluster in smaller units.





# Kubernetes workloads

**Namespaces** provide for a scope of Kubernetes resource, carving up your cluster in smaller units.

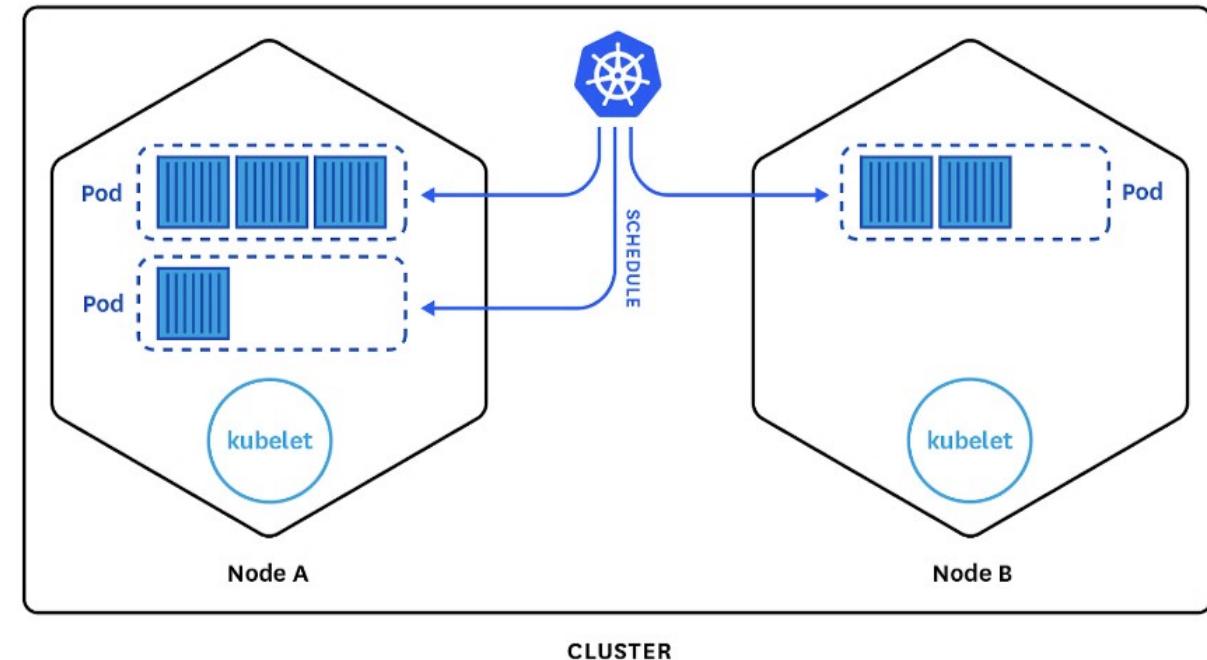
A screenshot of a macOS terminal window titled "— bash — 80x24". The window shows two commands being run:

```
$ kubectl create ns coba2
$ kubectl get ns
```



# Kubernetes workloads

**Pod** is a collection of containers sharing a network and mount namespace and is the basic unit of deployment in Kubernetes.



<https://devopscube.com>



# Kubernetes workloads

```
— -bash — 80x24

$ kubectl -n coba run nginx --image=nginx:1.17.7-alpine --port=80
$ kubectl -n coba get pods
$ kubectl -n coba create -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/twocontainers.yaml
$ kubectl -n coba exec twocontainers -c shell -i -t -- bash
```



# Kubernetes workloads



**Labels** are the mechanism you use to organize Kubernetes objects.



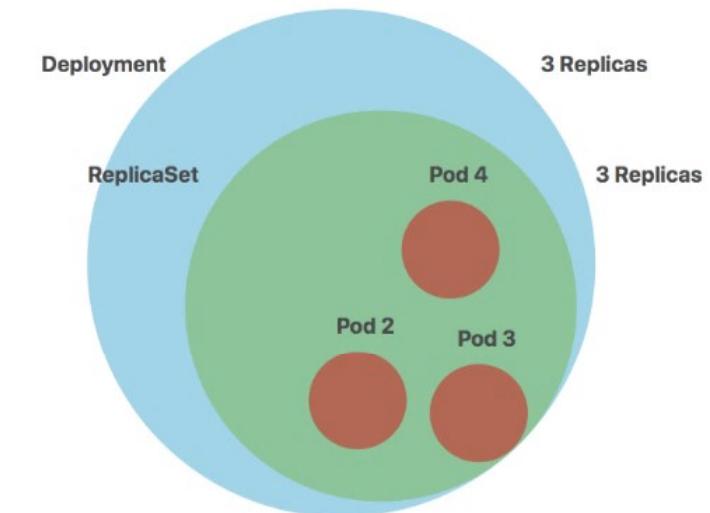
<https://datadoghq.com>



# Kubernetes workloads



**Deployment** is a supervisor for pods, giving you fine-grained control over how and when a new pod version is rolled out as well as rolled back to a previous state.



<https://learnk8s.io>



# Kubernetes workloads

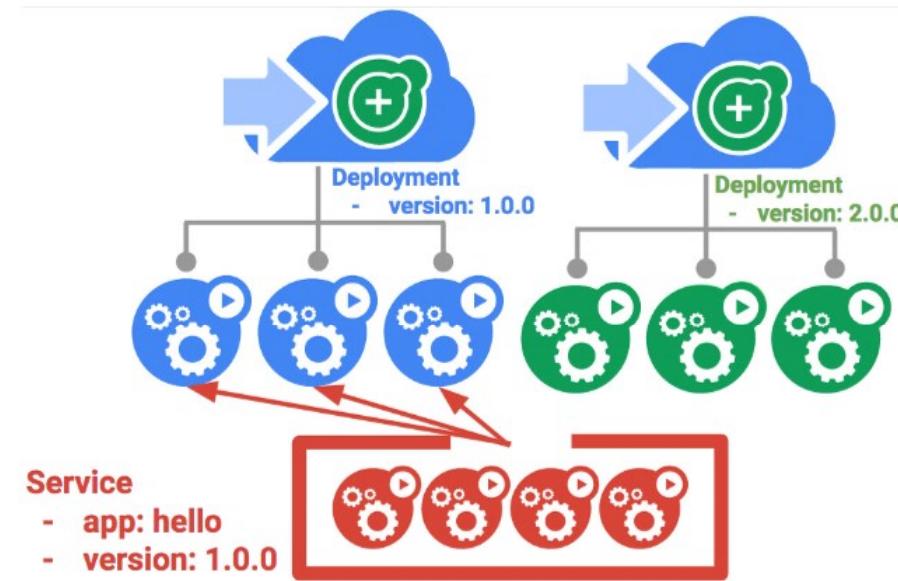
```
— -bash — 80x24

$ kubectl -n coba create -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/deployment-demo-1.yaml
$ kubectl -n coba get pods
$ kubectl -n coba get deploy
$ kubectl -n coba get rs
$ kubectl -n coba pods
```



# Kubernetes workloads

**Rolling updates** allow Deployments update to take place with zero downtime by incrementally updating Pods instances with new ones. The new Pods will be scheduled on Nodes with available resources.





# Kubernetes workloads

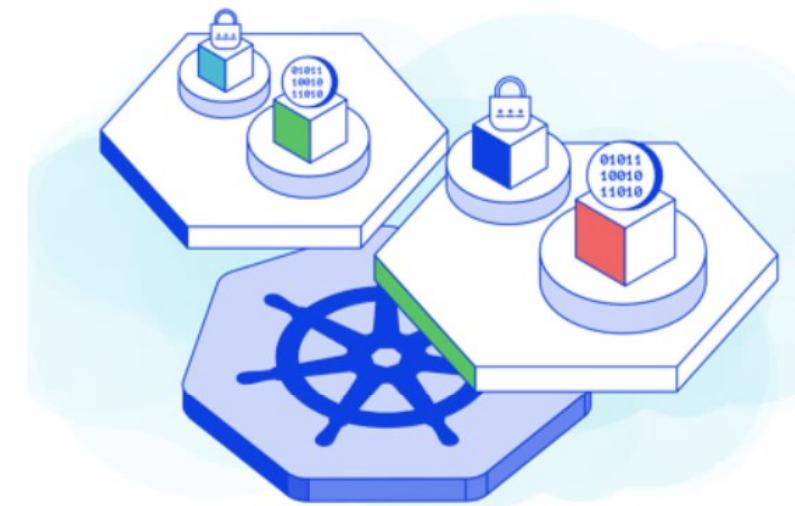
```
— -bash — 80x24

$ kubectl -n coba apply -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/deployment-demo-2.yaml
$ kubectl -n coba rollout history deployment/nginx-deployment
$ kubectl -n coba rollout undo deployment/nginx-deployment --to-revision=1
```



# Kubernetes workloads

**Secrets** provide you with a mechanism to use such information in a safe and reliable way.



<https://blog.alcide.io/secret-hunting-in-kubernetes>



# Kubernetes workloads



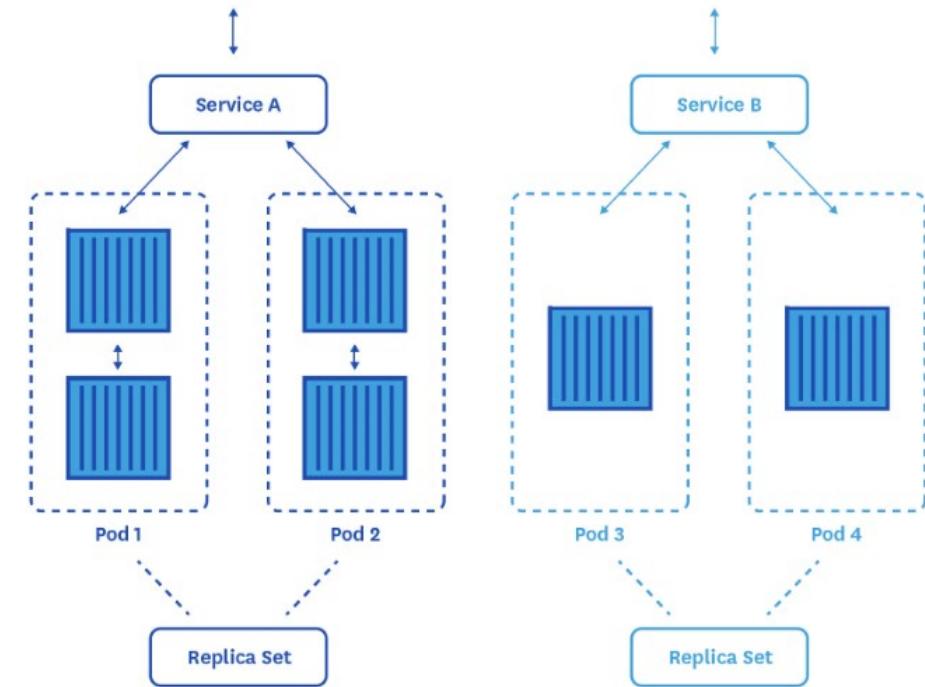
```
— -bash — 80x24

$ echo -n "AlterraAcademy00Jaya4b4di" > ./apikey.txt
$ kubectl -n coba create secret generic apikey --from-file=./apikey.txt
$ kubectl -n coba describe secrets/apikey
$ kubectl -n coba create -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/secrets-demo.yaml
```



# Kubernetes workloads

**Service** is an abstraction for pods, providing a stable, so called virtual IP (VIP) address.



<https://www.datadoghq.com/blog/monitoring-kubernetes-era/>



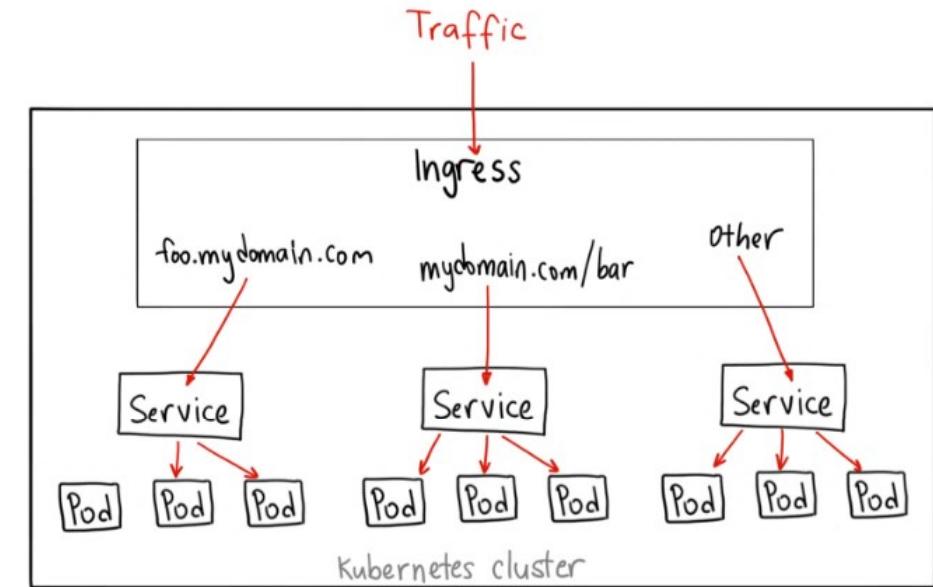
# Kubernetes workloads

```
$ kubectl -n coba create -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/deployment-demo-2.yaml
$ kubectl -n coba create -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/services-demo.yaml
$ kubectl -n coba get deploy,svc
```



# Kubernetes workloads

**Ingress** an API object that manages external access to the services in a cluster, typically HTTP.



<https://medium.com/google-cloud/kubernetes-nodeport-vs-loadbalancer-vs-ingress-when-should-i-use-what-922f010849e0>



# Kubernetes workloads



A screenshot of a terminal window titled "— -bash — 80x24". The window has three colored window control buttons (red, yellow, green) on the top-left and a small house icon on the top-right. The terminal content shows two commands being run:

```
$ kubectl -n coba create -f https://raw.githubusercontent.com/razinsurya/flask-demo/master/kubernetes-demo/ingress-demo/2048-ingress.yaml
$ kubectl -n coba get deploy,svc,ingress
```

**Task :**

**Run your application on top  
Kubernetes**



<https://twitter.com/memenetes/photo>

# TUGAS

# 6

## Deployment Kubernetes

1. Deploy your application by using kubectl from your local machine
  - a. Containerize go app (docker build)
  - b. Push to image registry (docker push)
  - c. Create kubernetes manifest
  - d. Try to perform kubectl apply
2. Create CI/CD to automate deployment with Kubernetes

Hint: You can use

<https://github.com/myrotvorets/kubectl-action>



**“Serverless” means you have servers, but can’t configure/customize them.**

**“No-code” means there is code, but you can’t change it.**

**“NoSQL” means you have to learn a new query language and implement your own transaction mechanisms.**

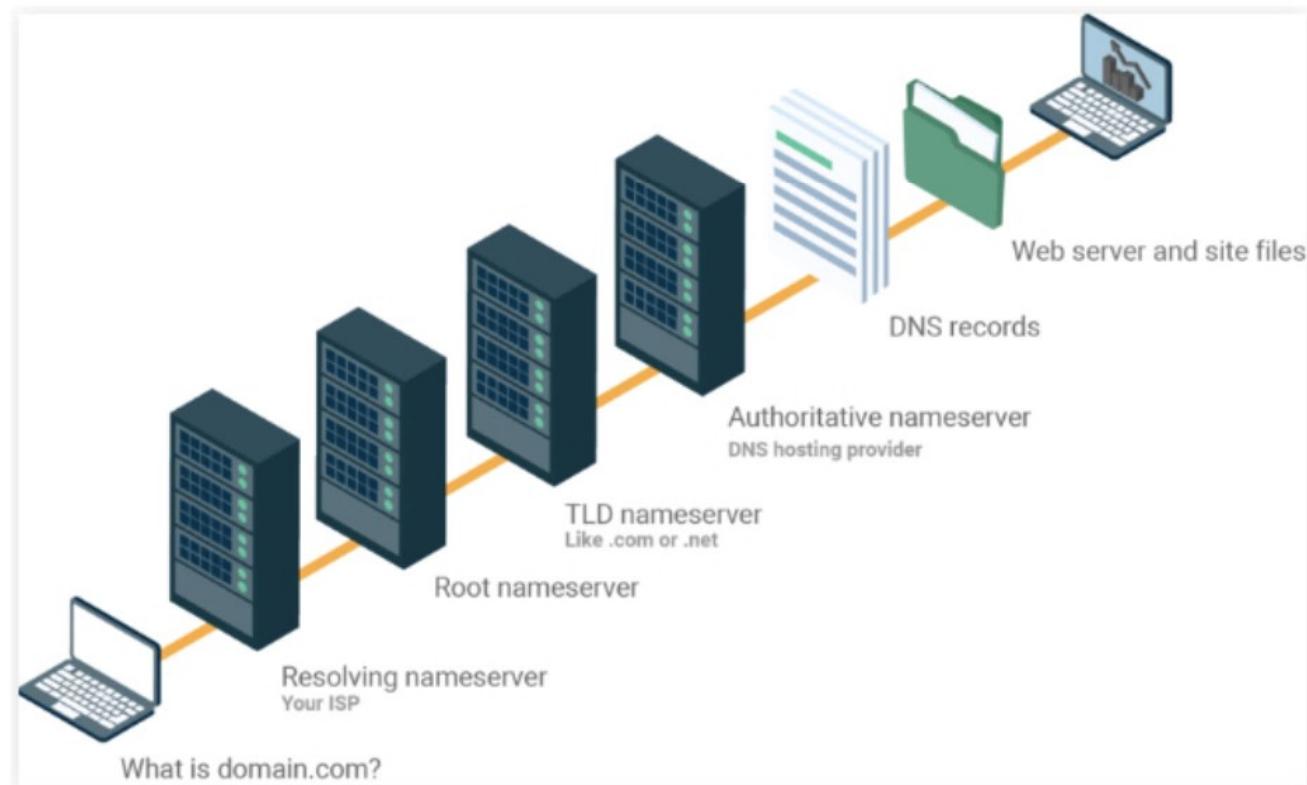
**Removing complexity is not always a win.**

**Kris Johnson**



# DNS (Domain Name Server)

DNS adalah sebuah sistem yang menghubungkan Uniform Resource Locator (URL) dengan Internet Protocol Address (IP Address).



.end  
Deployment