

# de.KCD summer school

## Day 1

### Technical introduction

Berlin Institute of Health  
Charité - Universitätsmedizin Berlin




# Schedule

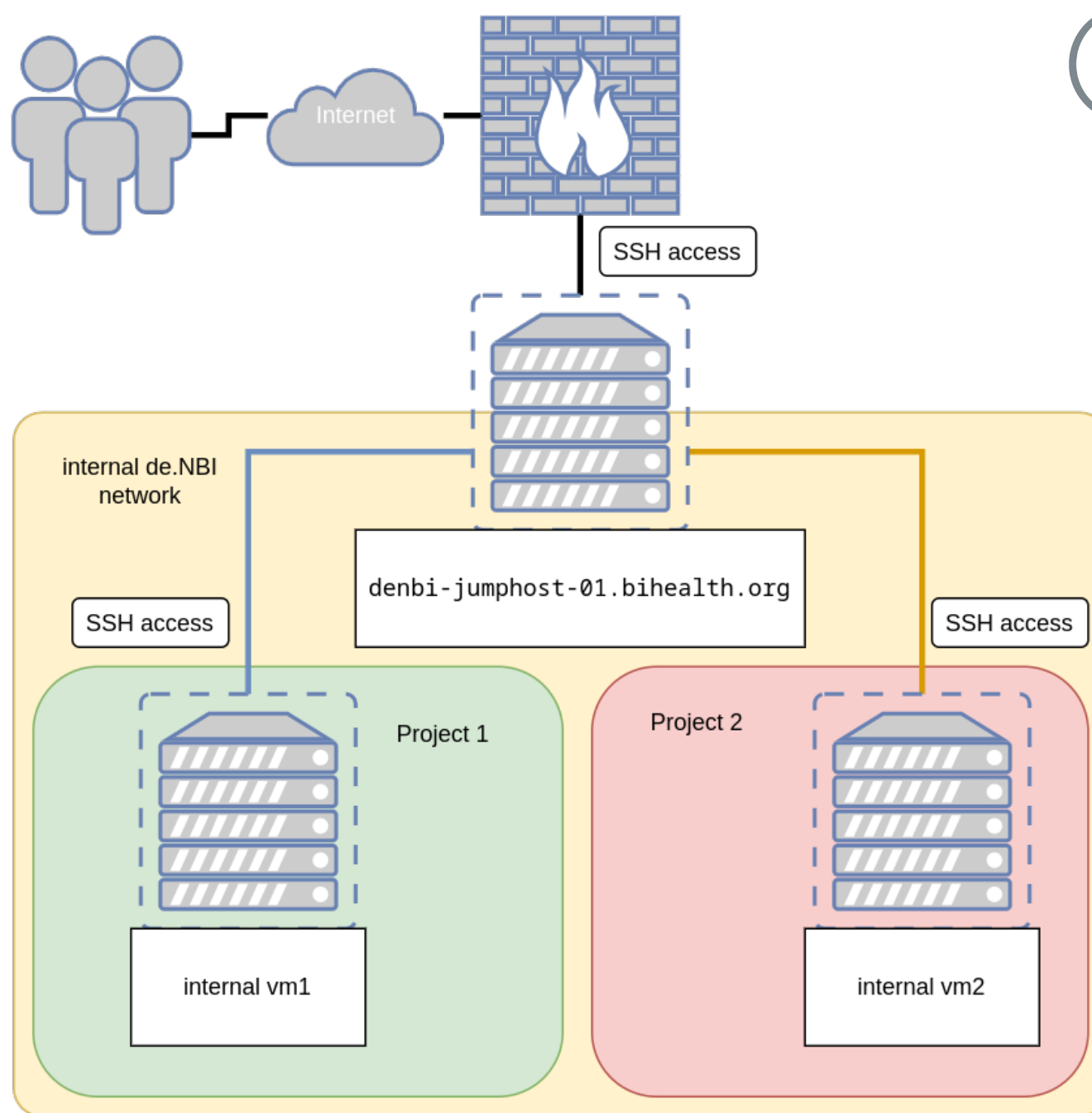


Image by vectorjuice on  
Freepik

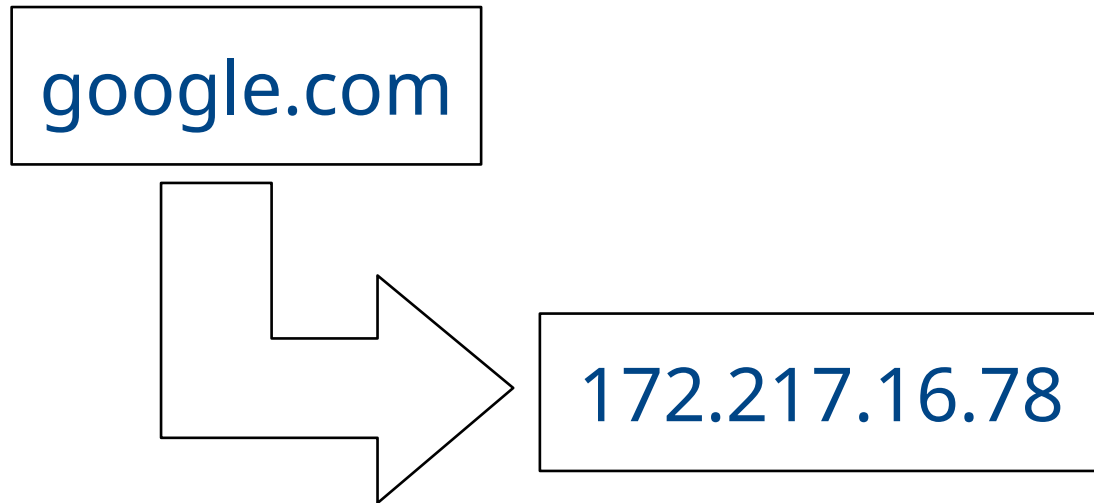
- Network access
- IP Addresses
- Virtualization
- Docker

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Date: 2024-09-12  
Version: 0.3

Legend	
project1-subnet	
project2-subnet	
internet access	



# IP and DNS



- ▶ Domain Naming System (DNS) translates domain names into IP addresses
- ▶ It makes it easier for users to access websites.
- ▶ IP addresses can change without the user noticing it.

# IPv4



Image by vectorjuice on  
Freepik

- ▶ IPv4 stands for Internet Protocol version 4.
- ▶ It is the fourth version of the Internet Protocol (IP).
- ▶ IPv4 is the most widely used protocol for internet communication.

# IPv4

172 . 217 . 16 . 78

- ▶ An IPv4 address is a 32-bit number in four octets separated by dots
- ▶ Each octet ranges from 0 to 255.
- ▶ There are public and private IP addresses

- ▶ Private IPs are not routable on the internet and are used within local networks.

- ▶ Private IP Addresses:

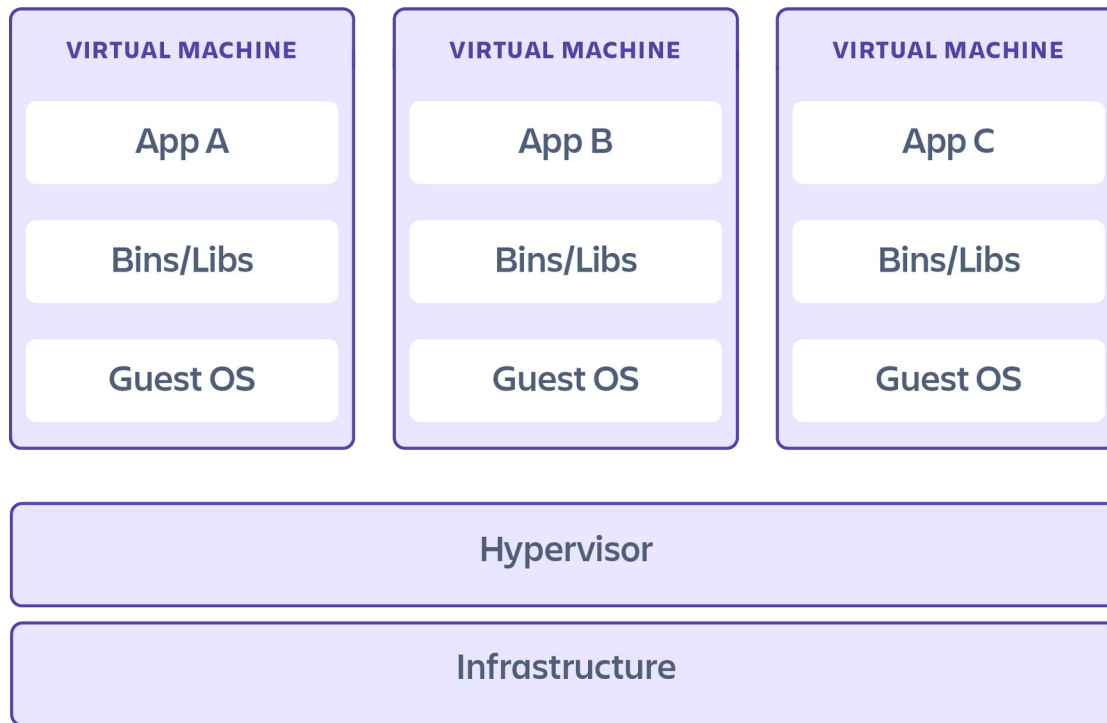
- 10.0.0.0 to 10.255.255.255
- 172.16.0.0 to 172.31.255.255
- 192.168.0.0 to 192.168.255.255

## IPv4

- ▶ Public IP Addresses are routable on the internet and globally unique.
- ▶ Not all IPs are usable
- ▶ Special IP for localhost:
  - 127.0.0.1

# Virtualization

## Virtual machines



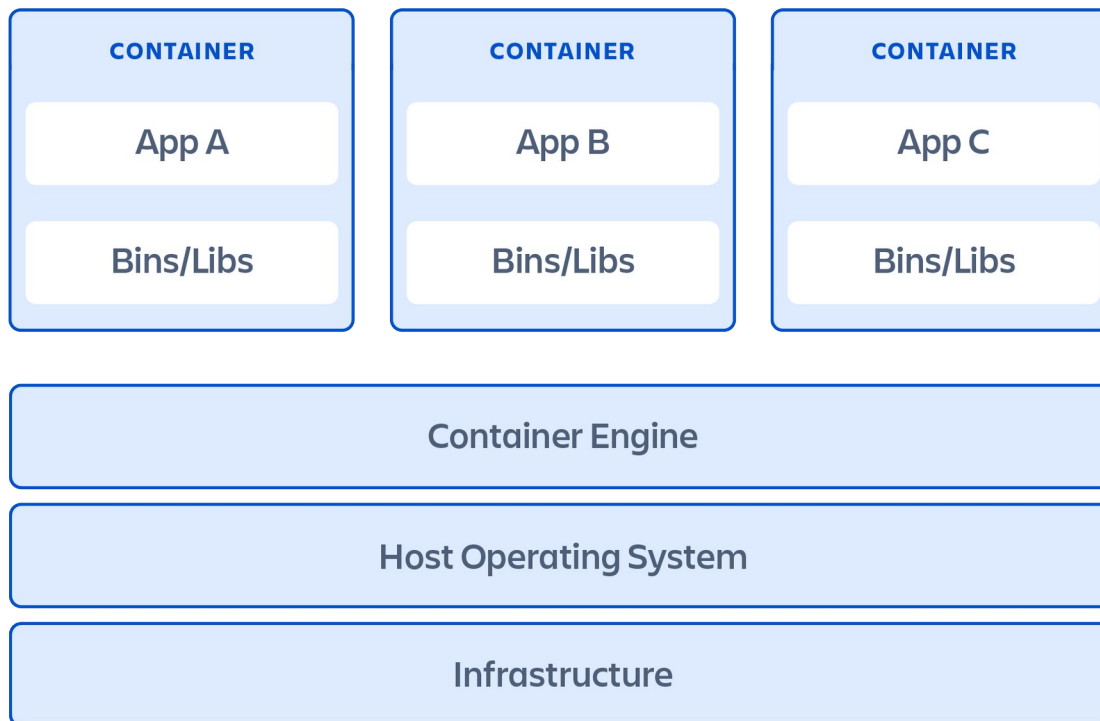
- ▶ Virtualized resources
- ▶ Virtual machine (vm) on hypervisor
- ▶ complete operating system with a file system and apps

<https://www.atlassian.com/microservices/cloud-computing/containers-vs-vms>



# Virtualization

## Containers



- ▶ Virtualized operating system
- ▶ Container in container engine
- ▶ Uses host drivers and system interfaces
- ▶ All needed apps

<https://www.atlassian.com/microservices/cloud-computing/containers-vs-vms>

```
FROM nginx:latest

COPY nginx.conf /etc/nginx/nginx.conf
COPY index.html /var/www/html/

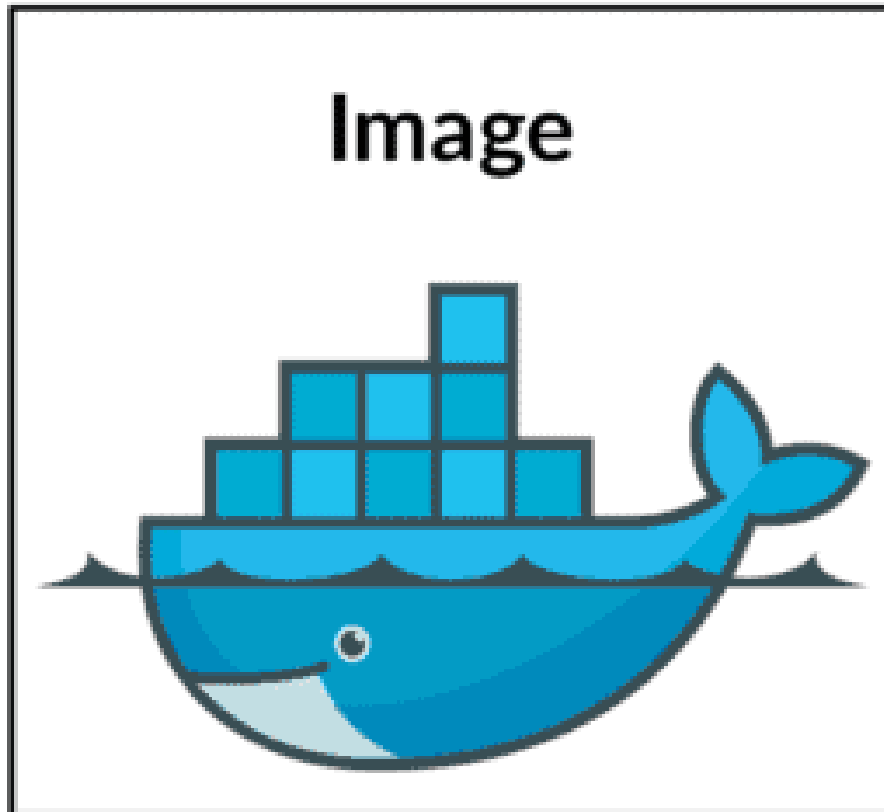
EXPOSE 80

CMD ["nginx", "-g", "daemon off;"]
```

## Dockerfile

# Docker file

- ▶ Text file
- ▶ Declarative description of docker image
- ▶ Can contain any number of commands
- ▶ Applicable to any system running docker

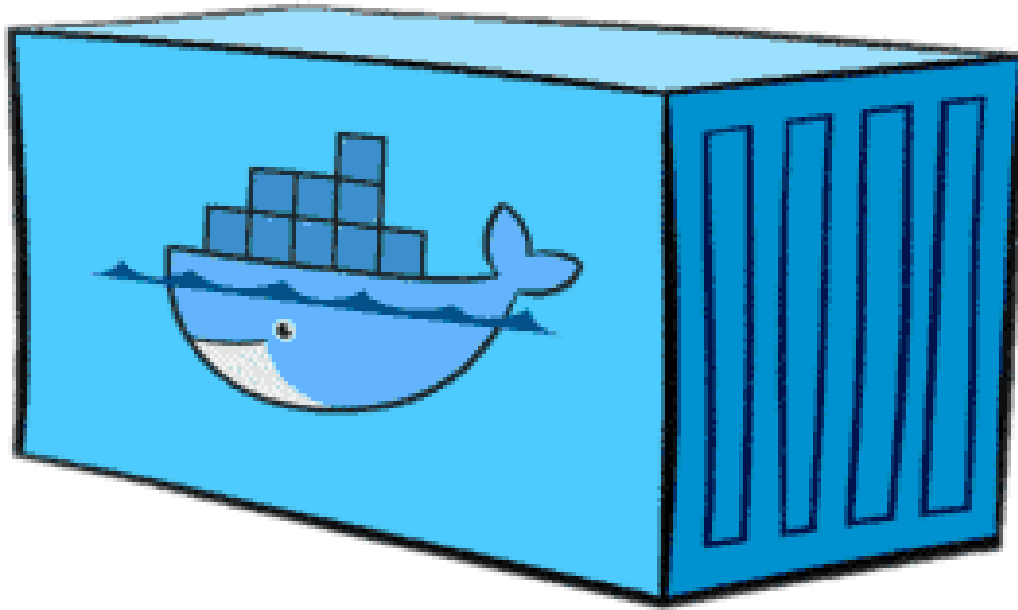


# Docker image

- ▶ Image file
- ▶ Can contain all needed apps and configs
- ▶ Can be stored to register
- ▶ Can be run to always execute the same process

[https://k21academy.com/wp-content/uploads/2020/06/DockerFile\\_Diagram-min-1024x357.png](https://k21academy.com/wp-content/uploads/2020/06/DockerFile_Diagram-min-1024x357.png)

# Docker container



- ▶ Actual running collection of apps for a specific purpose
- ▶ Contains all apps and configs from image
- ▶ Can be used in all docker environments

[https://k21academy.com/wp-content/uploads/2020/06/DockerFile\\_Diagram-min-1024x357.png](https://k21academy.com/wp-content/uploads/2020/06/DockerFile_Diagram-min-1024x357.png)