Containers and their advantages

INTRODUCTION TO DOCKER

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datacamp

Prerequisites

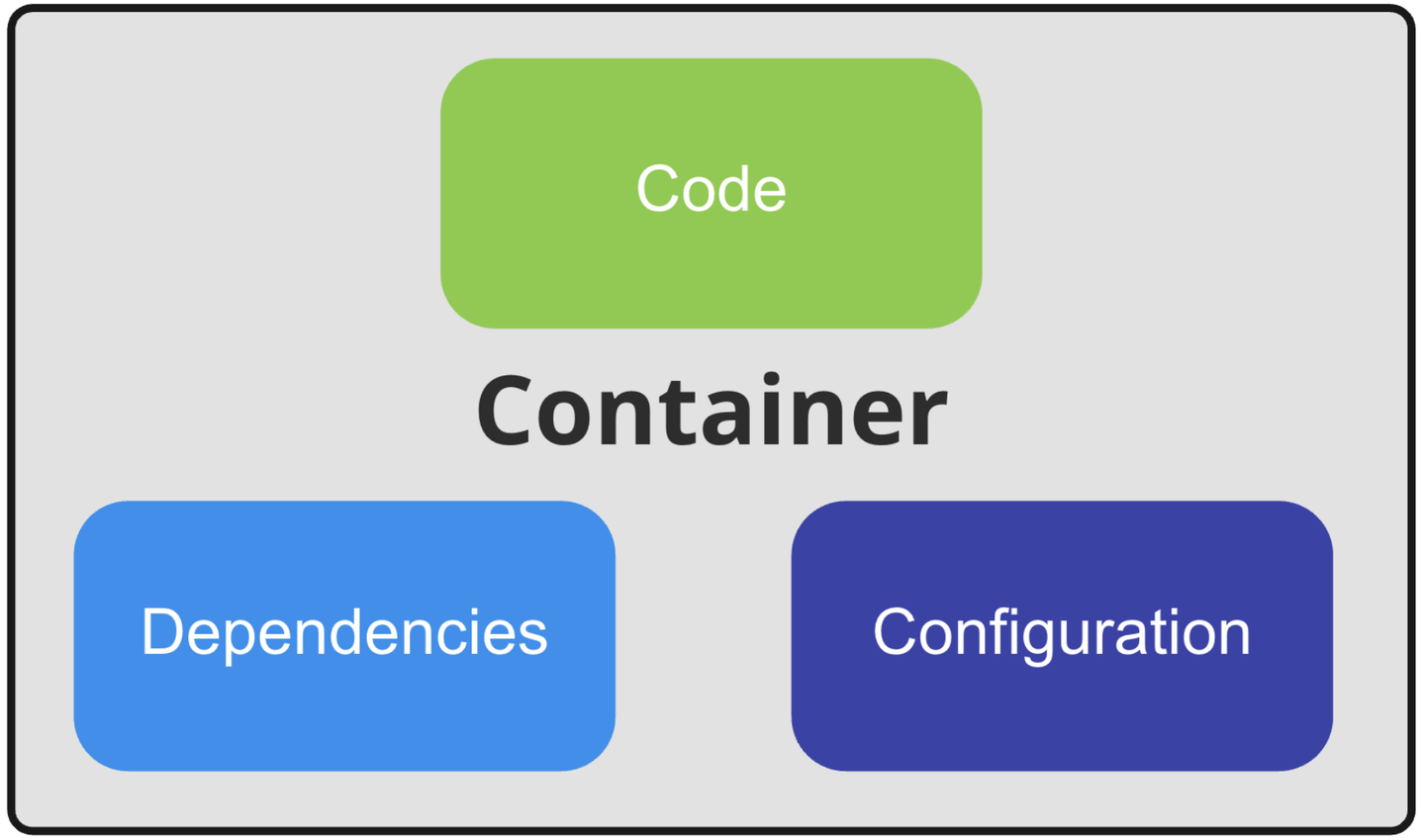
Please take DataCamp's **Introduction to Shell** before starting this course.

We will use:

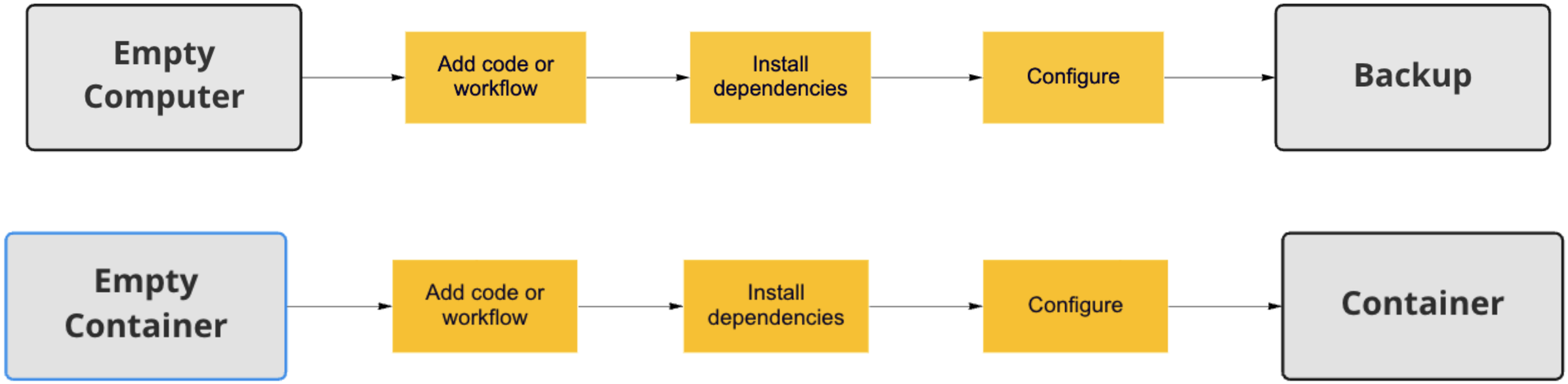
- `nano` to edit files.
- `ls`, `cd`, and `mkdir` to find our way in and manage the file system.

Containers

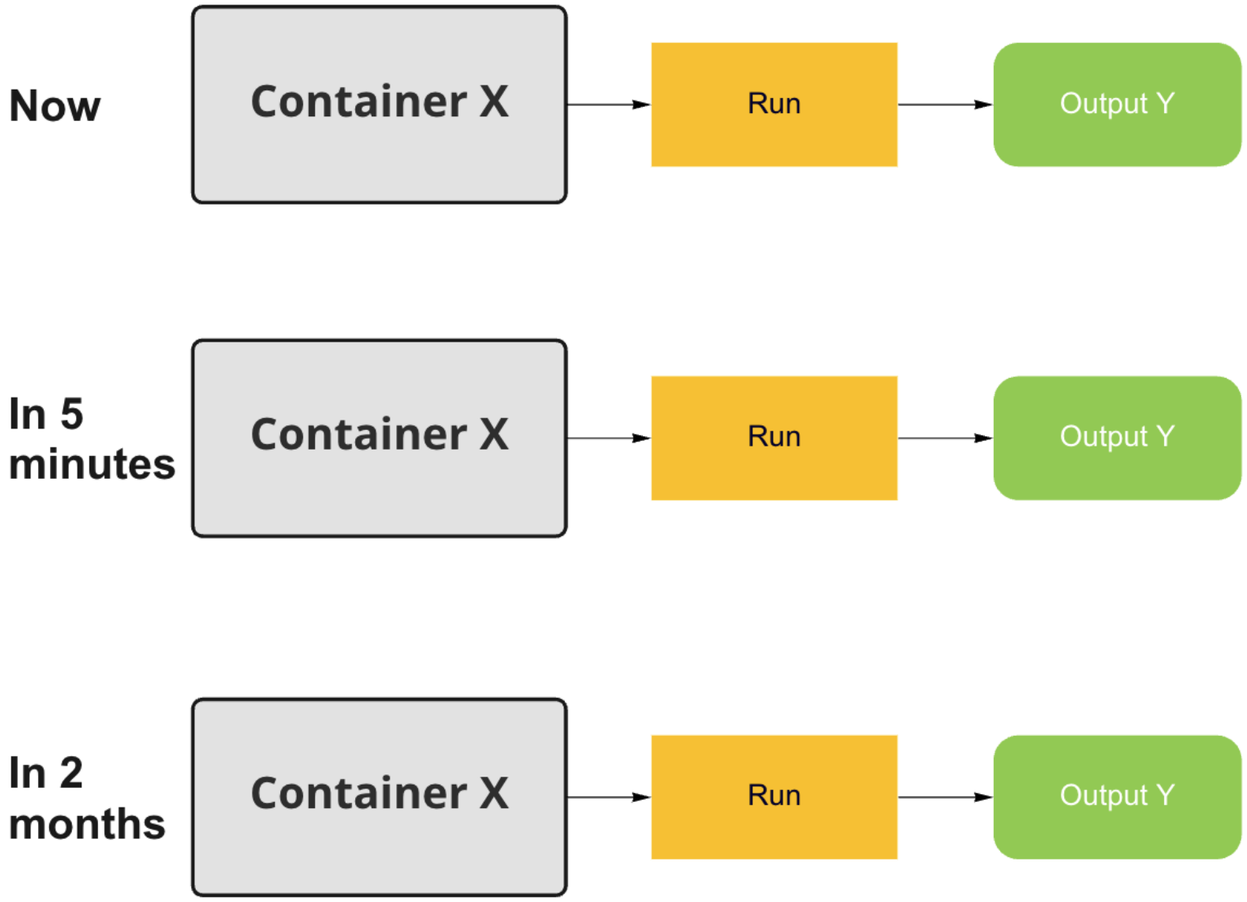
A portable computing environment



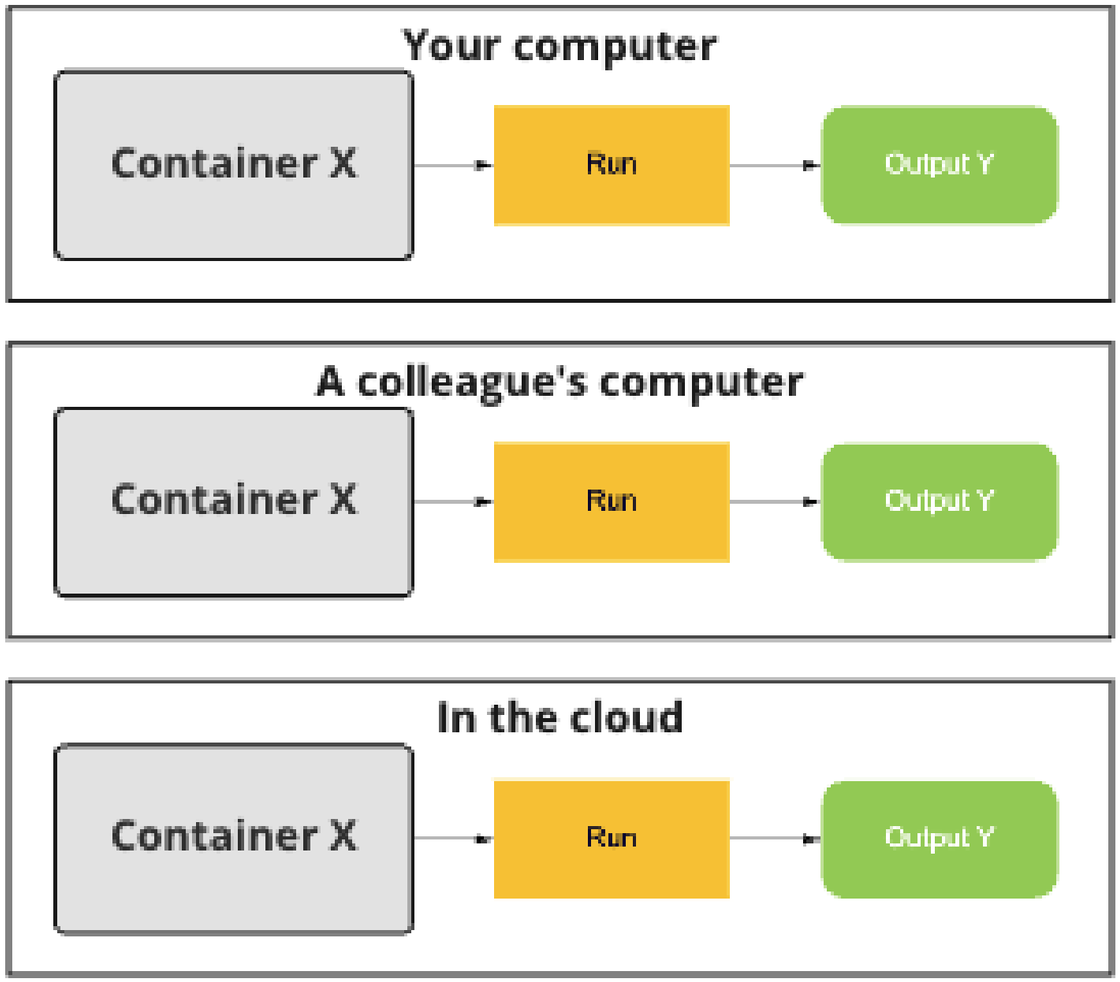
Making it less abstract



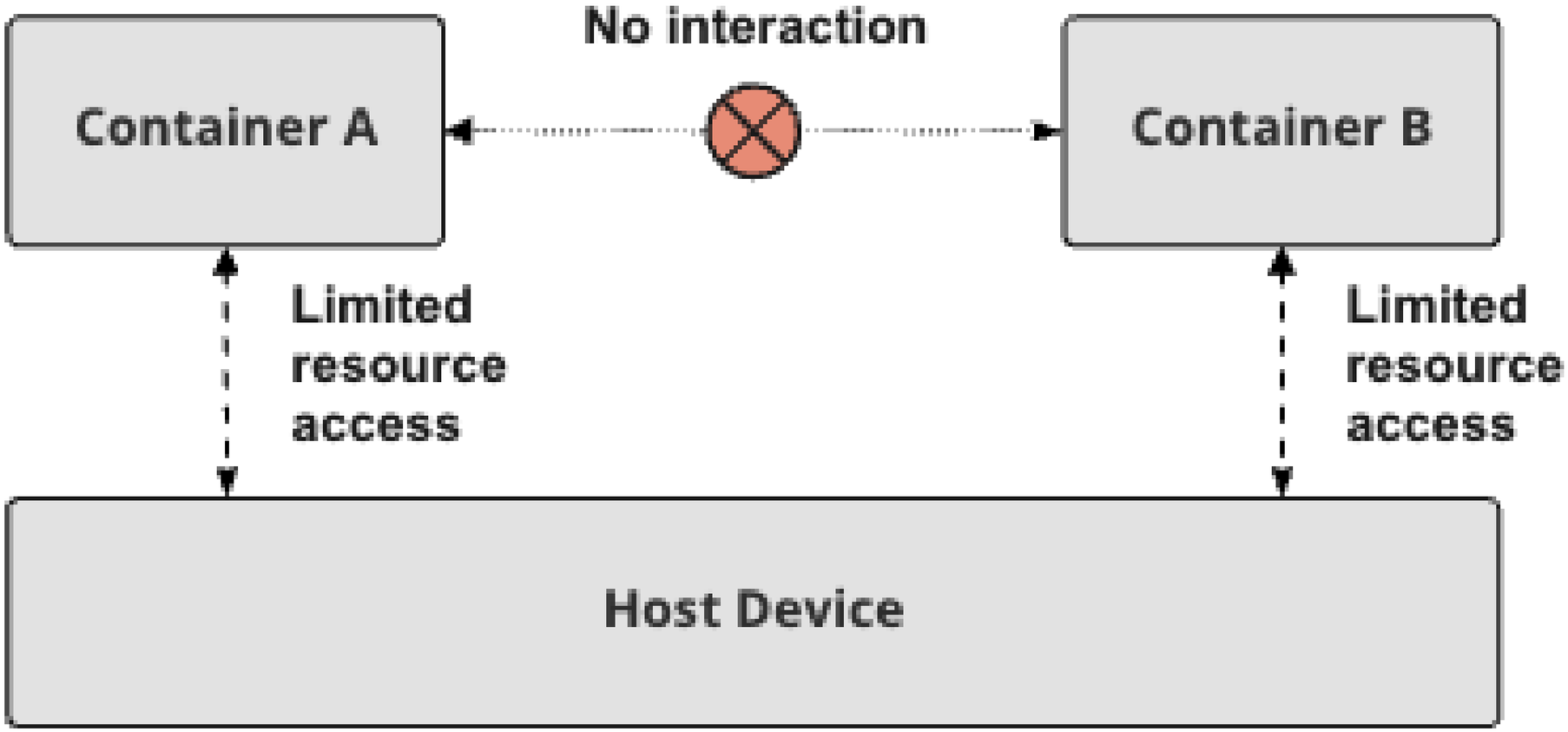
Containers run identically every time



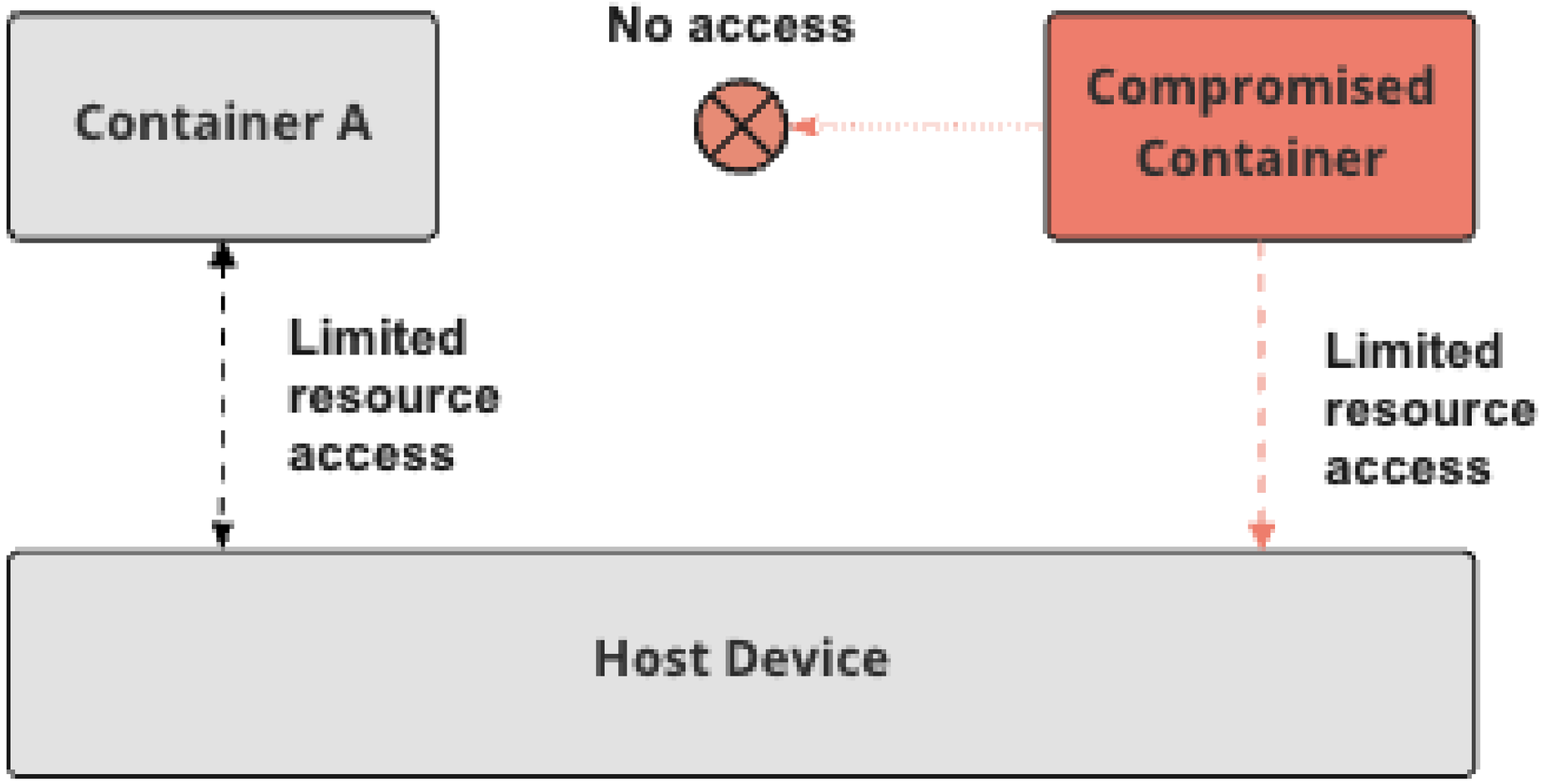
Containers run identically everywhere



Isolation


No interaction
Container A
Container B
Limited
resource
access
Limited
resource
access
Host Device

Containers provide security



Containers are lightweight

- Security
- Portability
- Reproducibility
- **Lightweight**
  - In comparison to running an application:
    - Outside of a container
    - Using a virtual machine

Containers and data science

- Automatically reproducible
- Dependencies are automatically included
- Datasets can be included
- Code will work on your colleagues machine
- Easier sharing than alternatives

Let's practice!

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The Docker Engine

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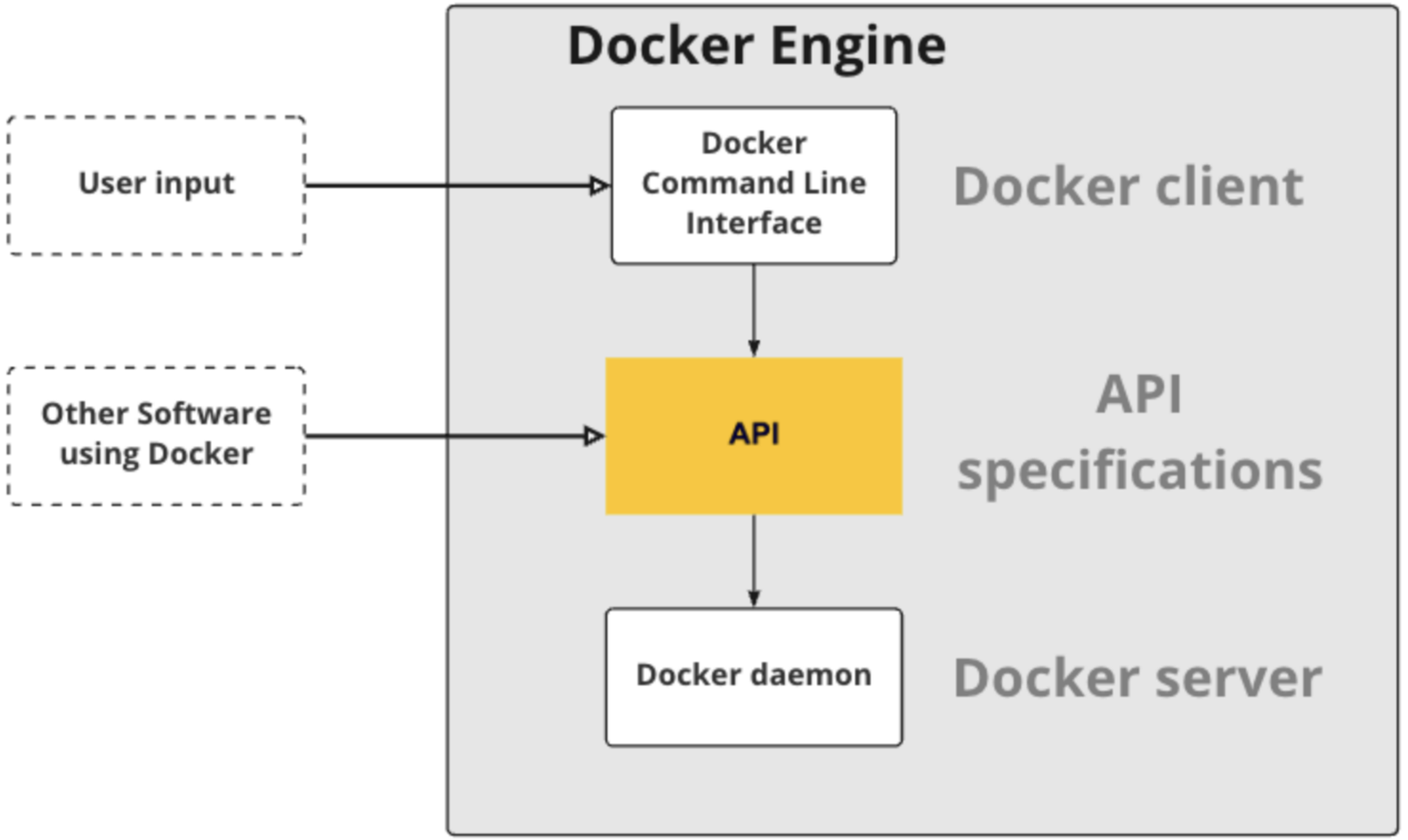
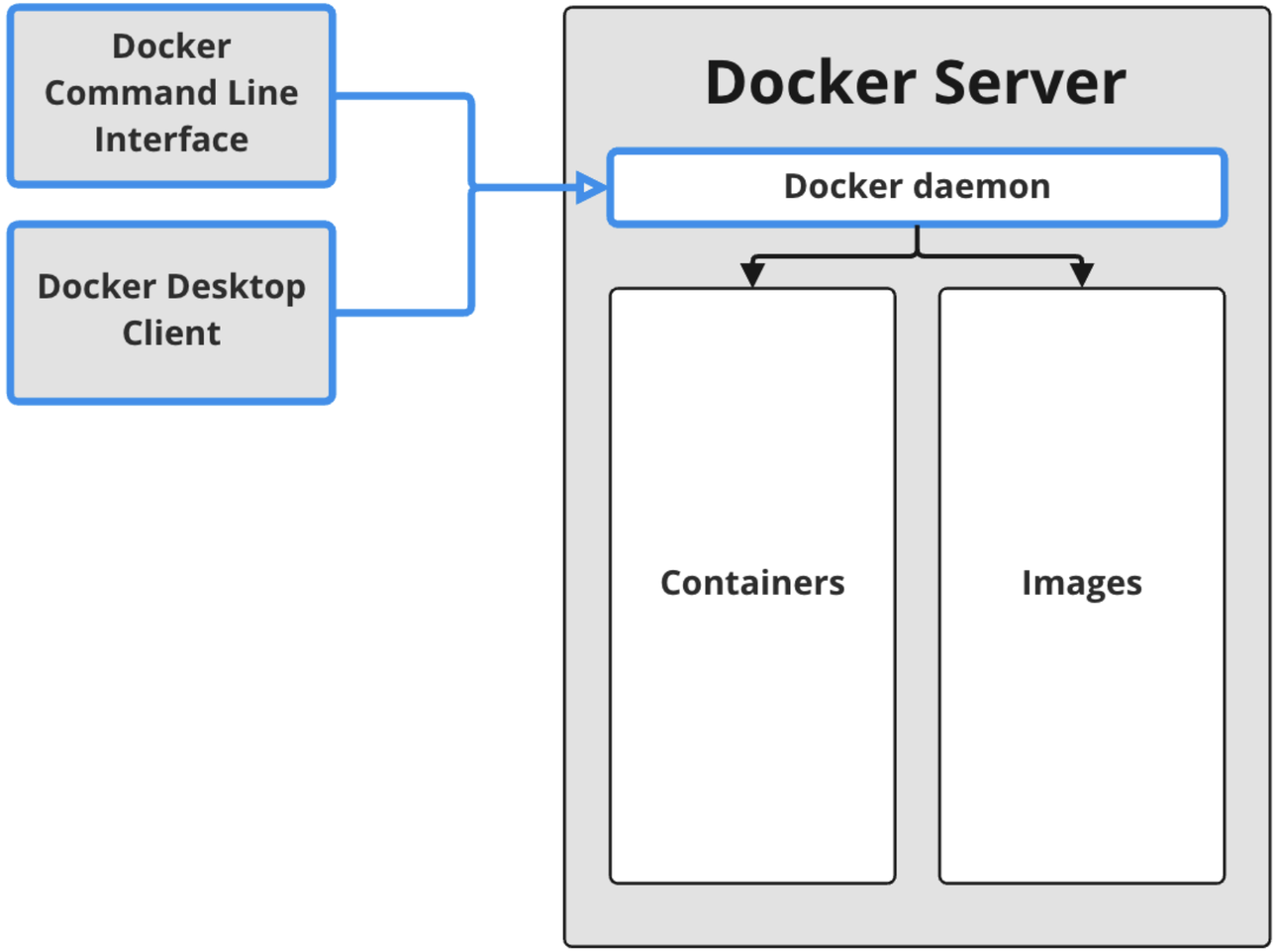
Docker ecosystem

Docker Engine



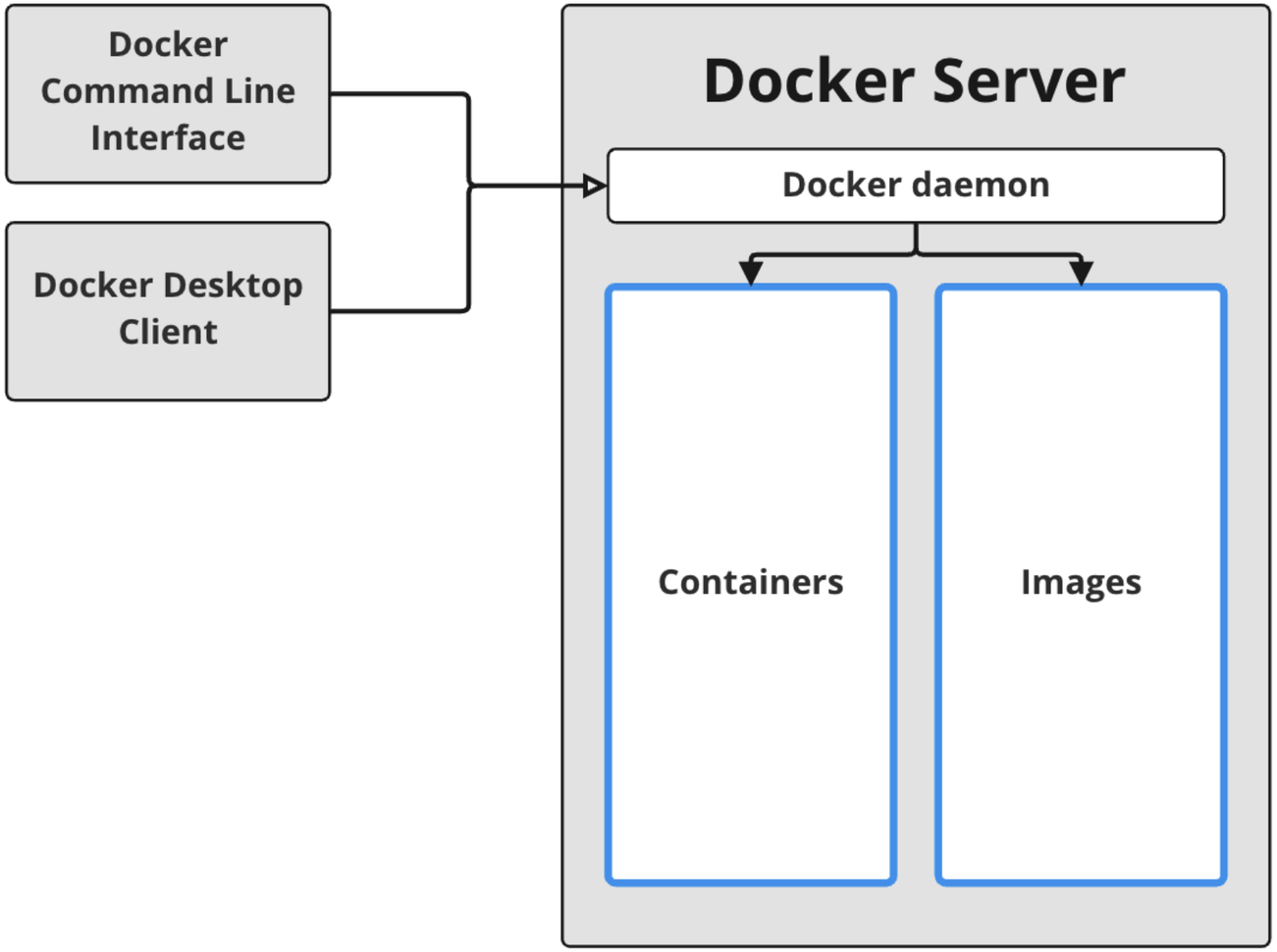
[1] https://docs.docker.com/engine/

The Docker daemon



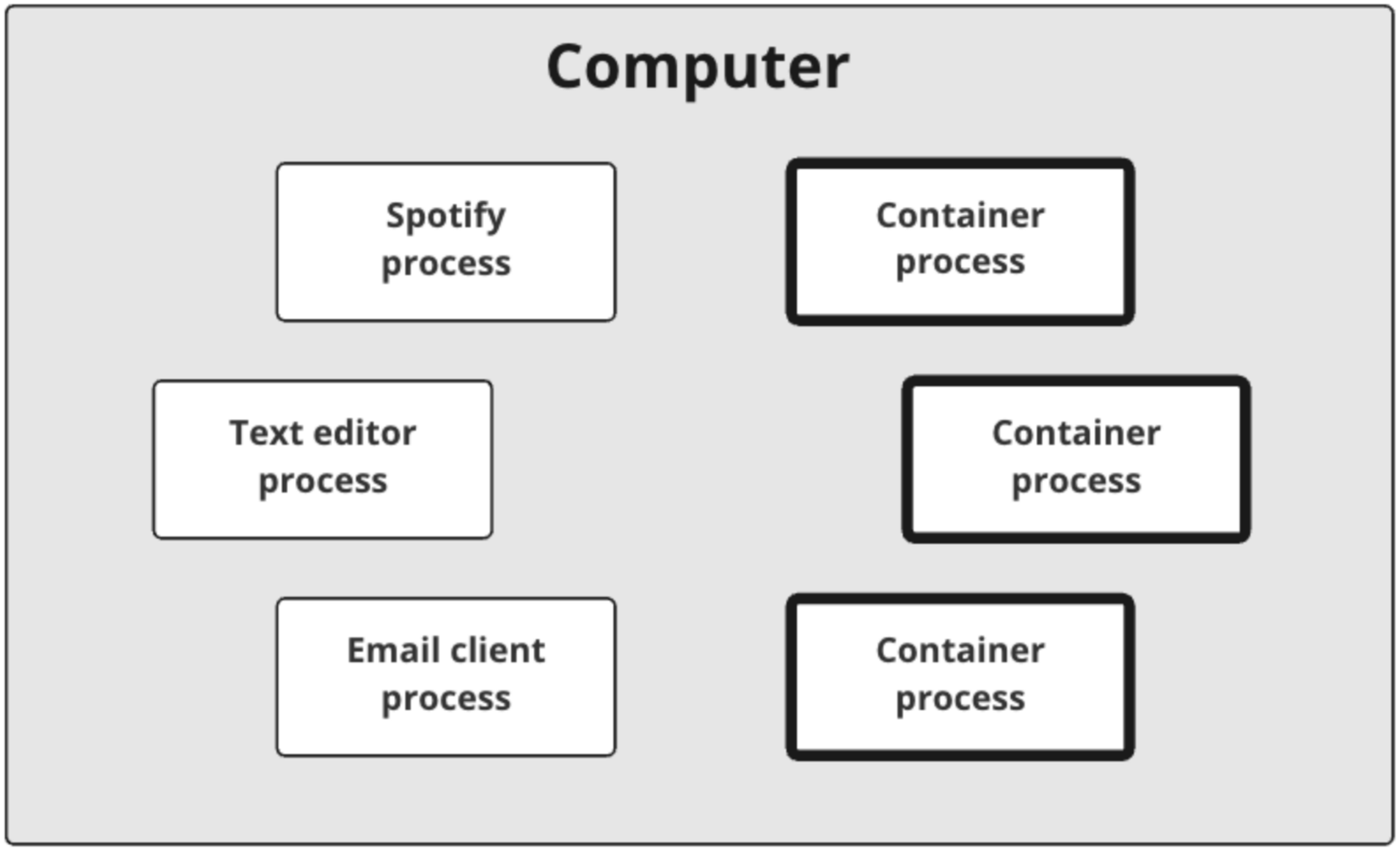
[1] https://docs.docker.com/engine/ [2] https://docs.docker.com/get-started/overview/#docker-architecture

Images and Containers

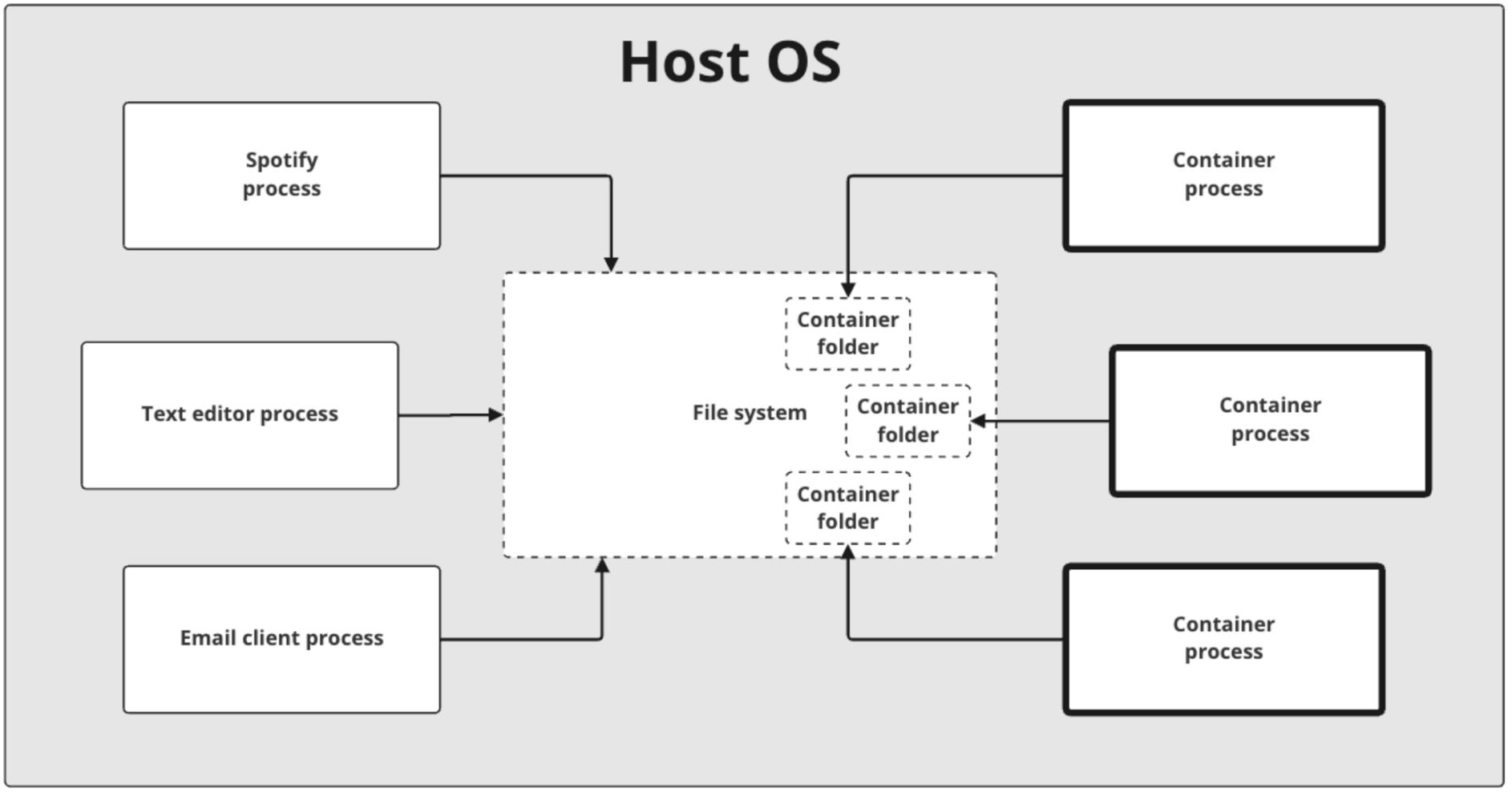


[1] https://docs.docker.com/engine/ [2] https://docs.docker.com/get-started/overview/#docker-architecture

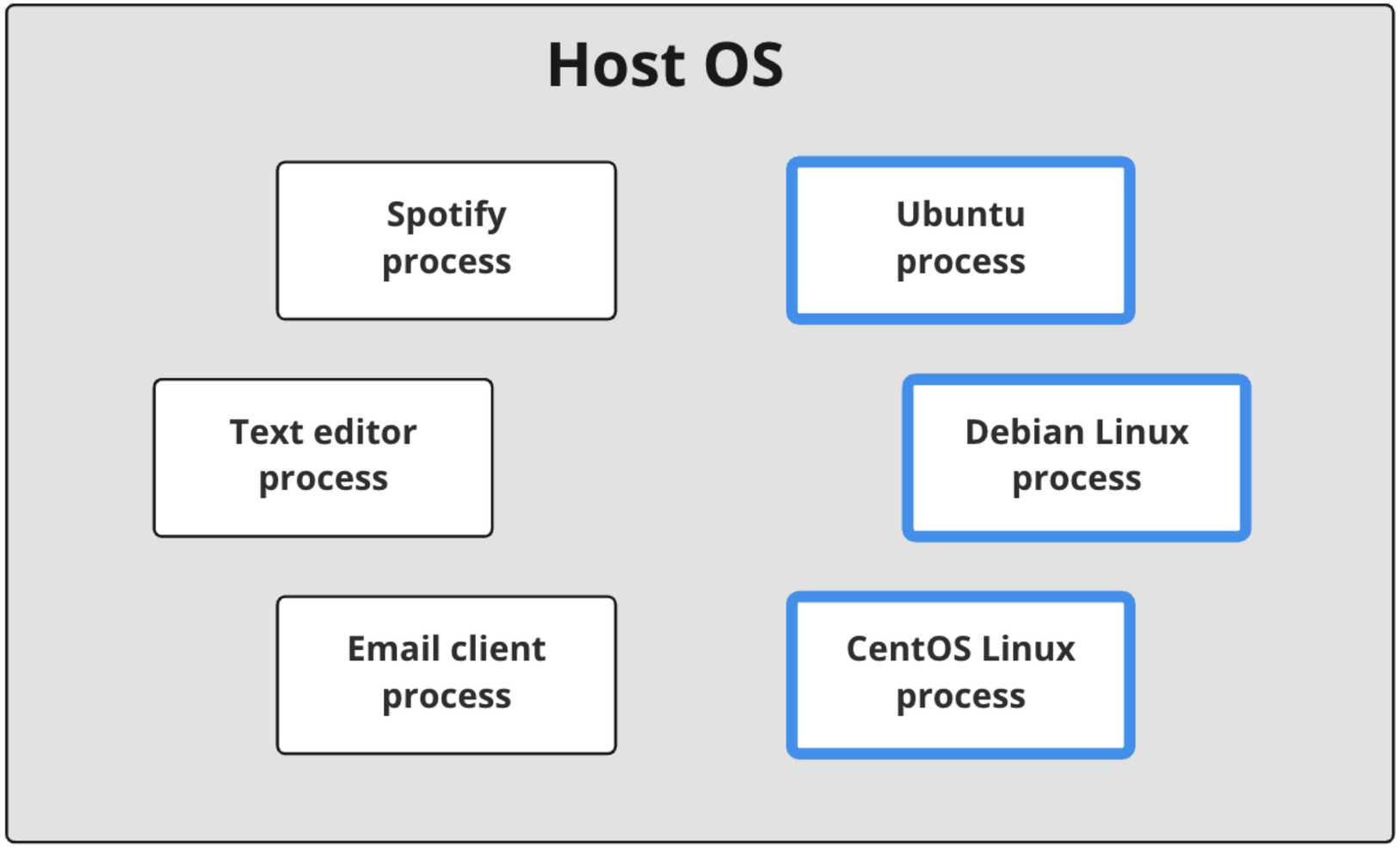
Containers are processes



Containers are processes



Containers are isolated processes



Let's practice!

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Containers vs. Virtual Machines

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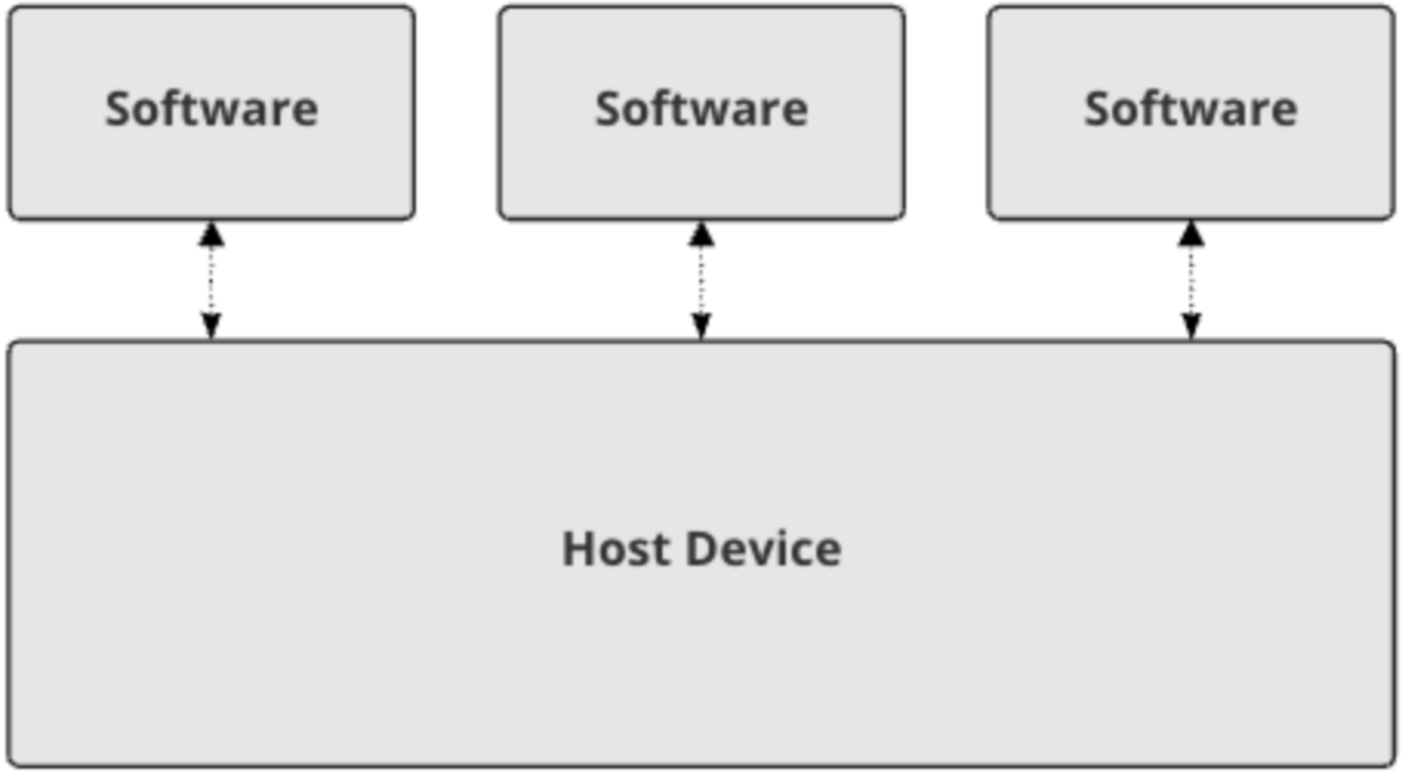
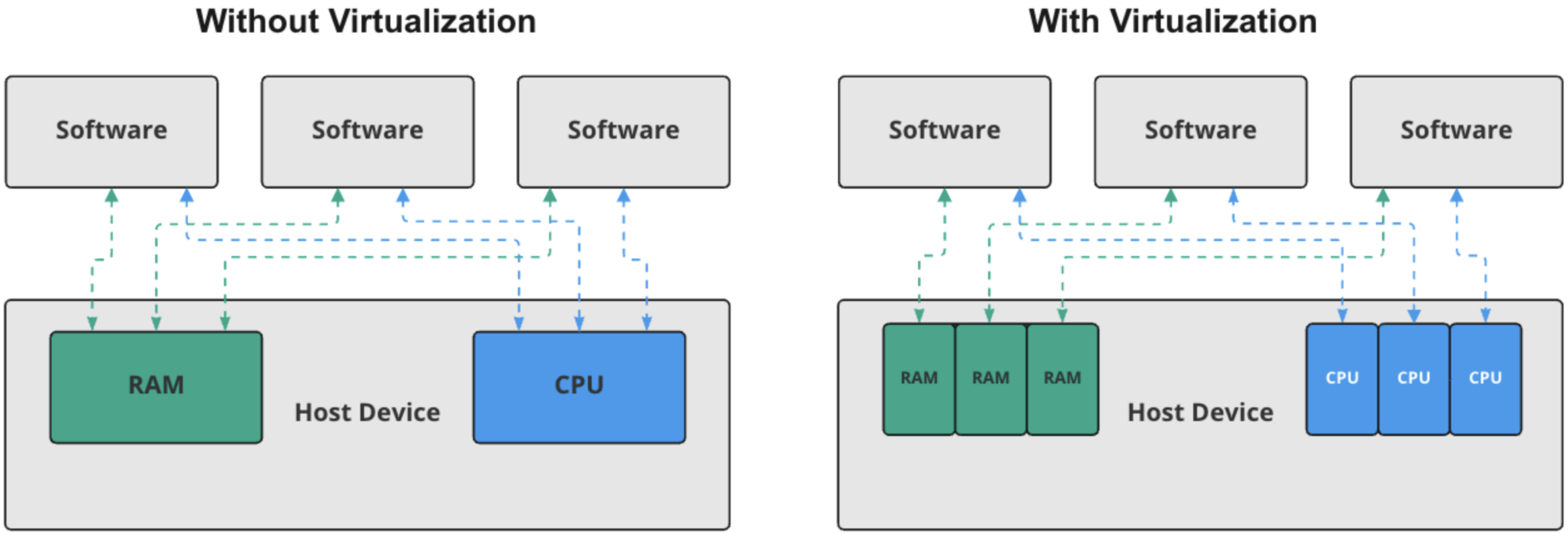
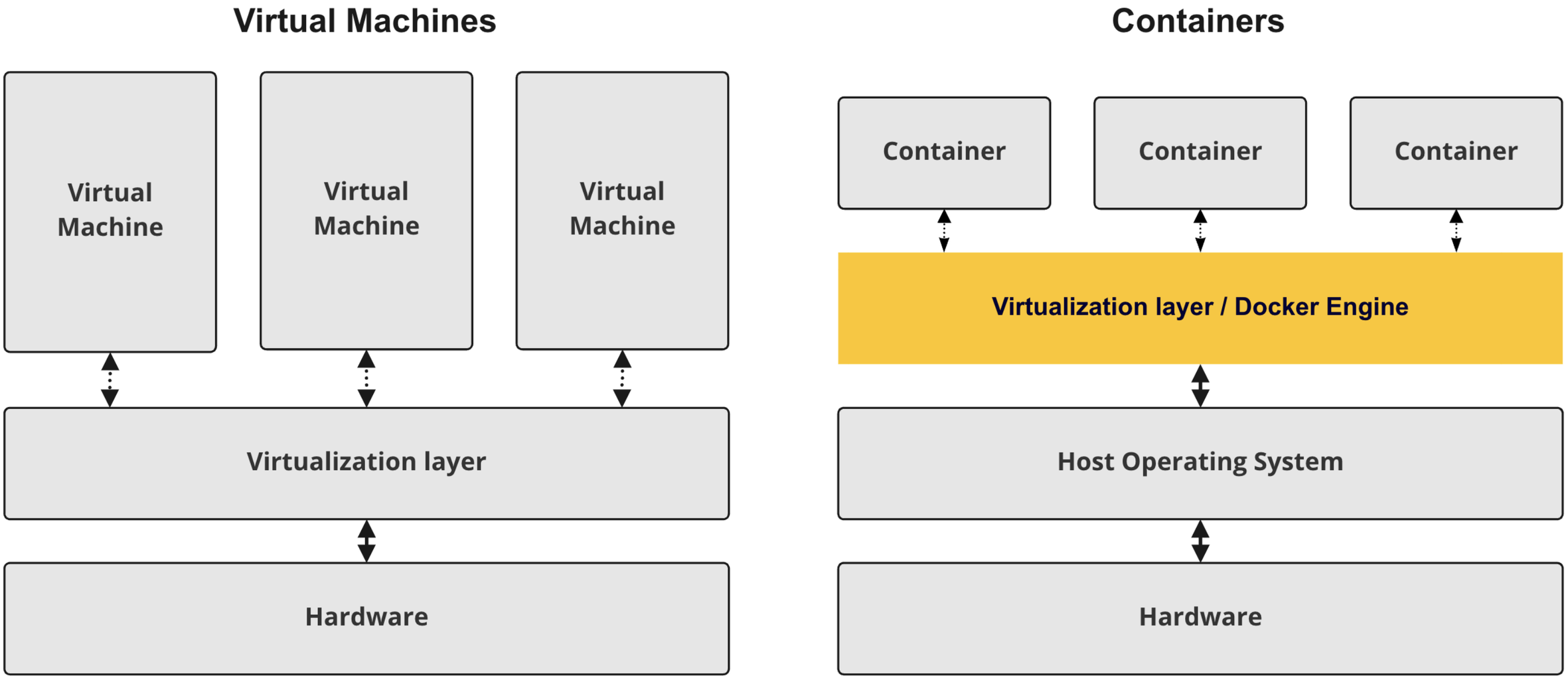
Containers and Virtual Machines



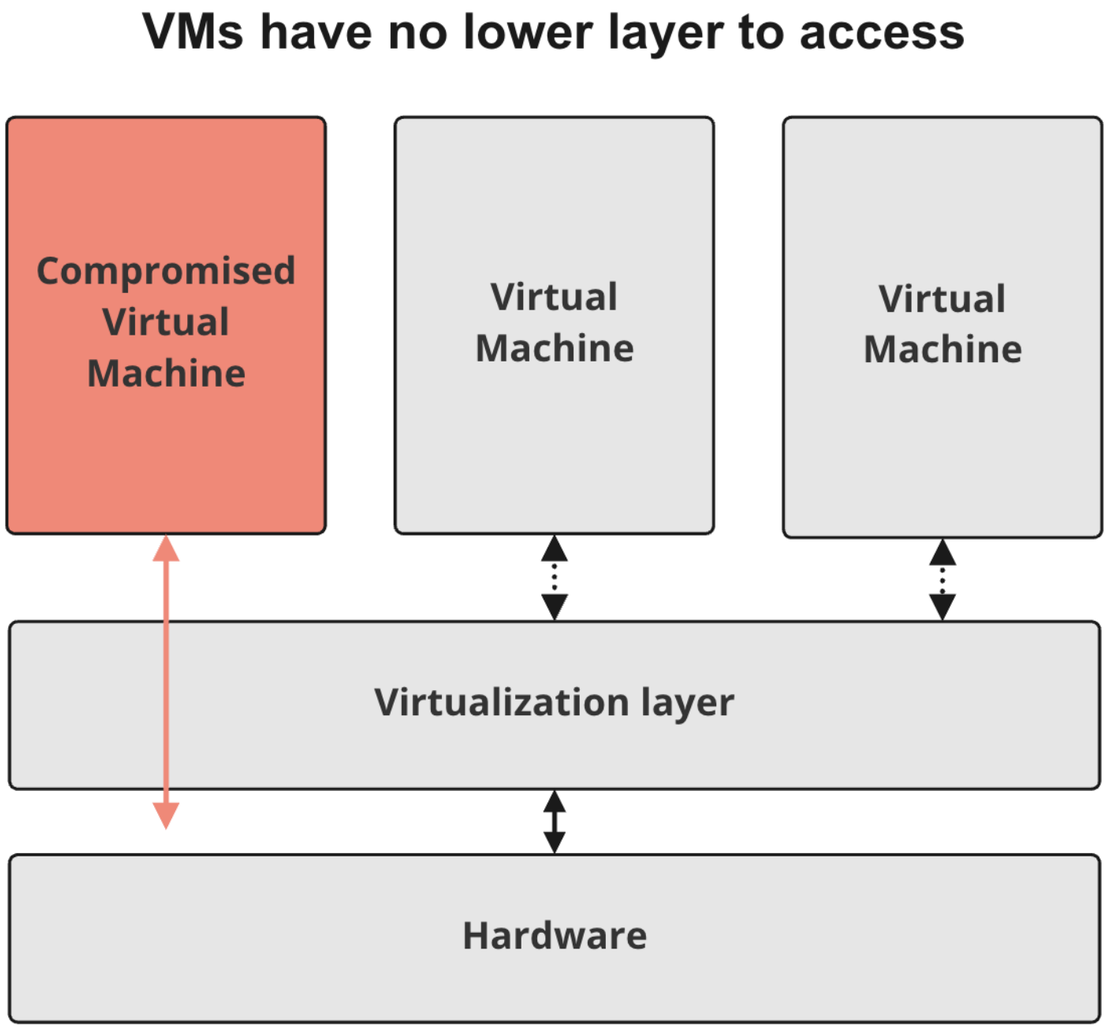
Resource Virtualization

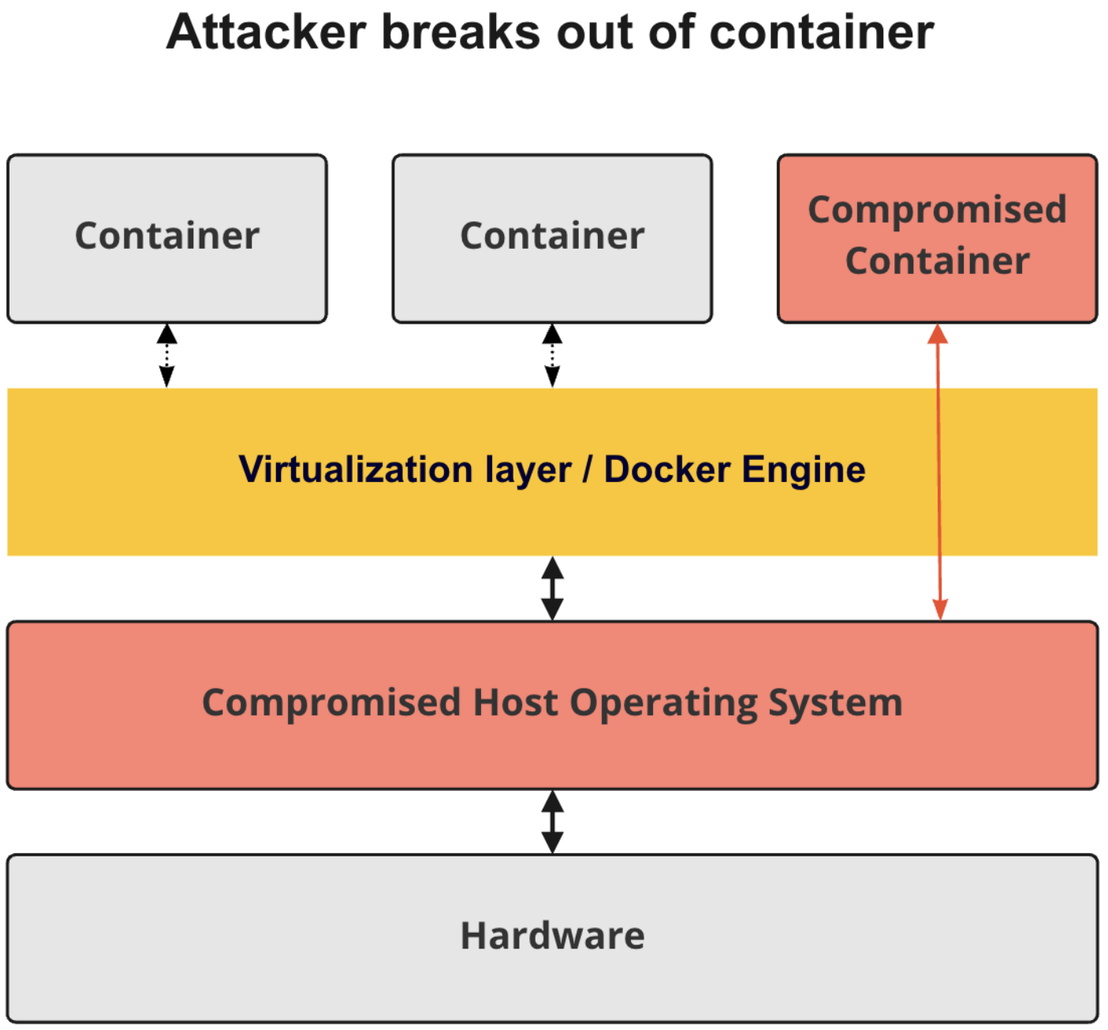


Containers vs Virtual Machines

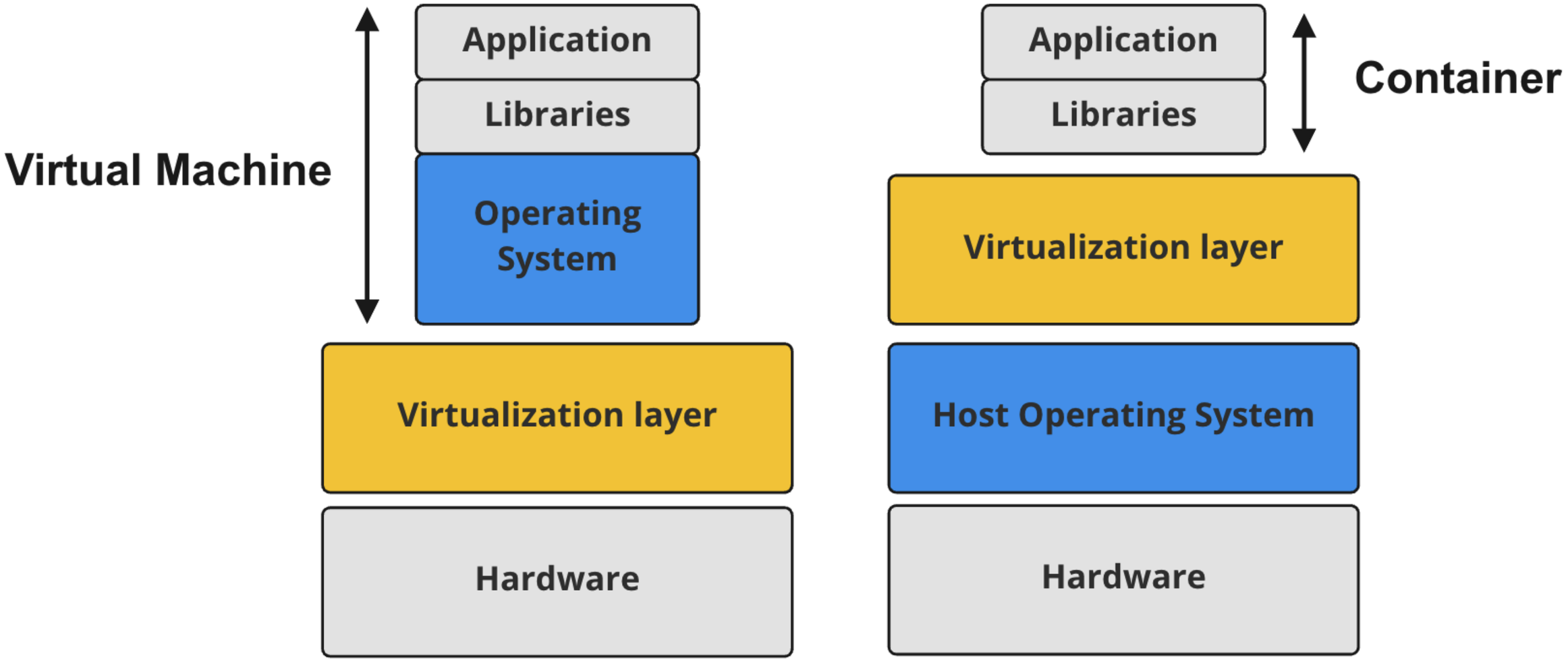


Security of Virtualization





Containers are lightweight



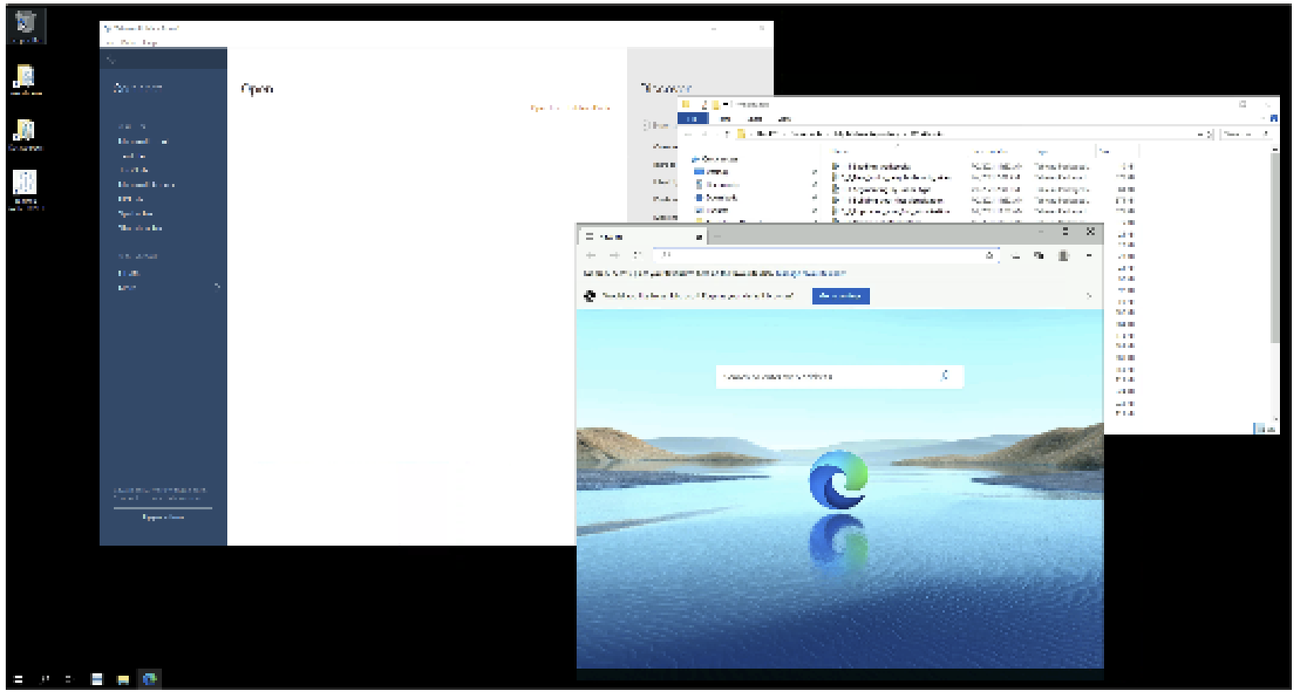
Advantages of containers

Because of their smaller size containers

- Are faster to
  - Start
  - Stop
  - Distribute
  - To change or update
- Have a large ecosystem of pre-made containers

Advantages of Virtual Machines

Graphical User Interface (GUI)



Command Line Interface (CLI)

```
root@47ac41fb1ff3:/# ls
bin  boot  dev  etc  home  lib  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
root@47ac41fb1ff3:/# cd tmp
root@47ac41fb1ff3:/tmp# ls
my_folder
root@47ac41fb1ff3:/tmp# cd my_folder/
root@47ac41fb1ff3:/tmp/my_folder# ls -a
.  ..  example.txt
root@47ac41fb1ff3:/tmp/my_folder# rm example.txt
root@47ac41fb1ff3:/tmp/my_folder# ls
root@47ac41fb1ff3:/tmp/my_folder# cd /
root@47ac41fb1ff3:/#
```

Let's practice!

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