



# Introduction to Docker

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# Schedule



- Monday: Introduction
- Tuesday: Xen
- Wednesday: Xen
- Thursday: Docker
- Friday: Conclusion/homework solution

## Compare Search terms ▾

**docker**  
Search term

+ Add term

### Interest over time ?

☒ News headlines ☐ Forecast ?



# Topic Today

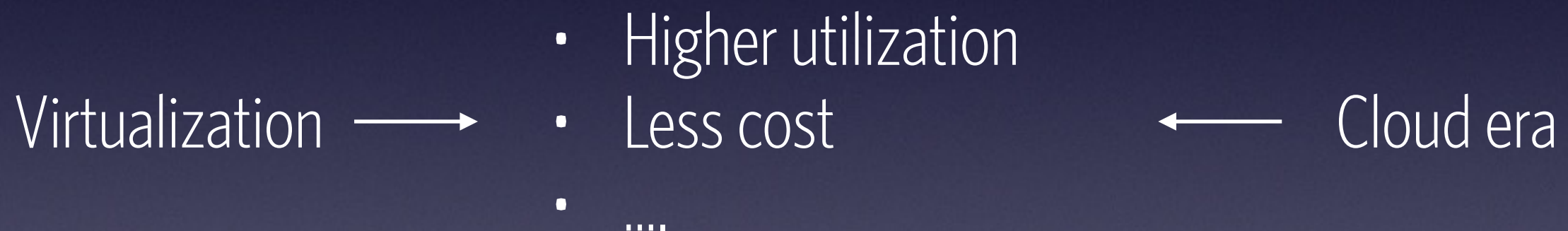
- What is container ?
- VM vs container
- What is docker ?
- Why is docker so popular ?

What is container ?



# What is Container ?

As the computing models develop, many old problems are solved and new problems come.



Virtualization changes the view we see resources and the way we manage resources. We can virtualize a small, independent and flexible machine in few minutes just like a real one.

# What is Container ?

Here is the new problem: when you just need a piece of resources, is that necessary to an entire virtual machine for that ?

Is there a simpler, faster and cheaper way ?

Therefore, the container comes out...

# What is Container ?



- Lightweight Linux environment
- Hermetically sealed, deployable application
- Introspectable, runnable artifact
- Recently popularized by Docker



# What is Container ?



Linux Containers (LXC) is an operating system-level virtualization method for running multiple isolated Linux systems (containers) on a single control host (LXC host).

—— Wikipedia

# VM vs Container



# Which is better ?

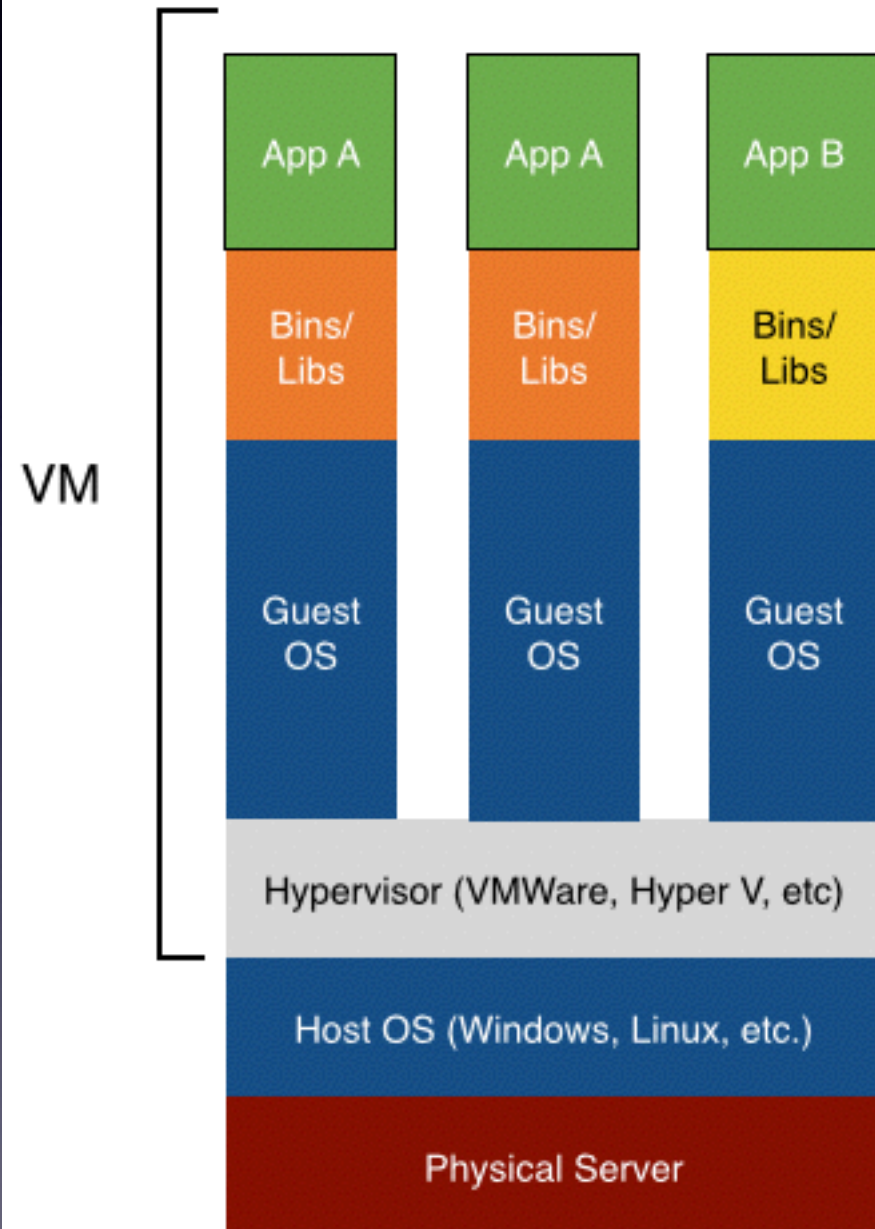


# VM vs Container

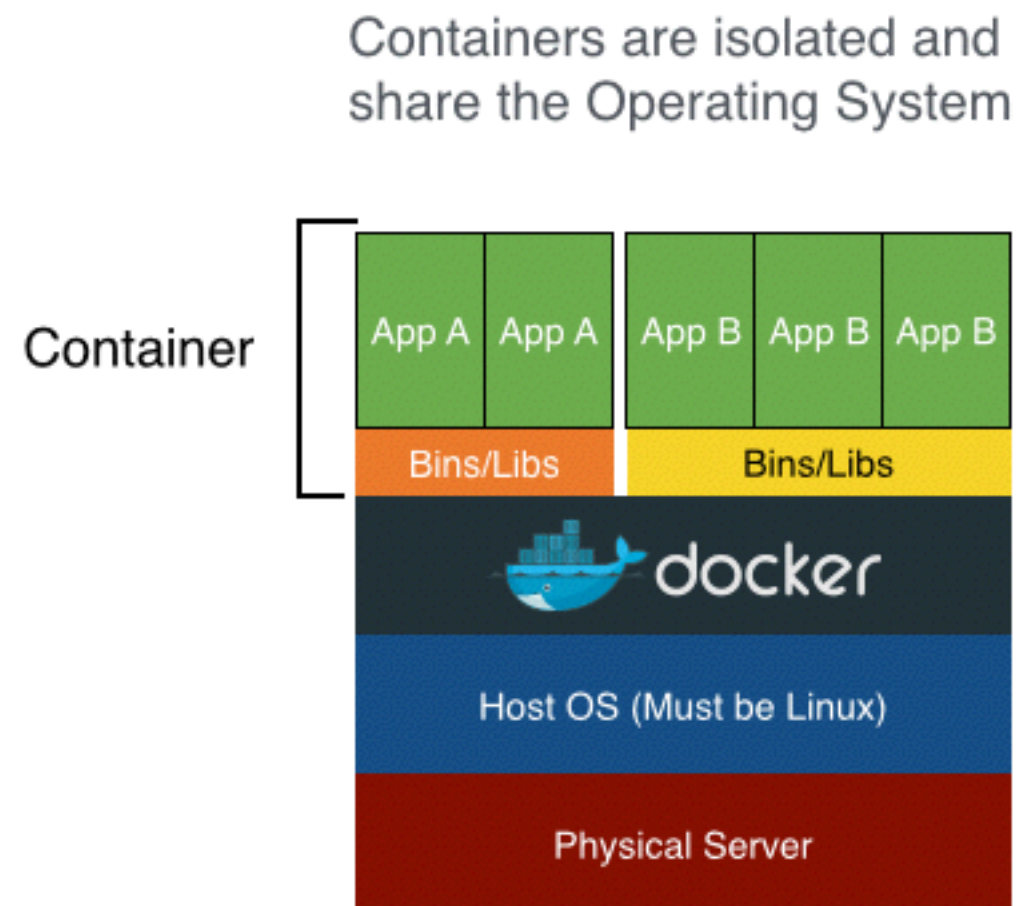
- A Virtual Machine
    - needs an hypervisor
    - a full OS inside
  - Bigger footprint
    - RAM needed
    - Storage space
  - Slower
    - 2 filesystems, 2 OSes
  - Strong resources management
- A Container
    - talks to the host kernel
  - Smaller footprint
    - less RAM needed
    - less Storage space
  - Faster
    - direct CPU access
  - Less sophisticated resources management



# VM vs Container



**Virtual Machine**



**Container**



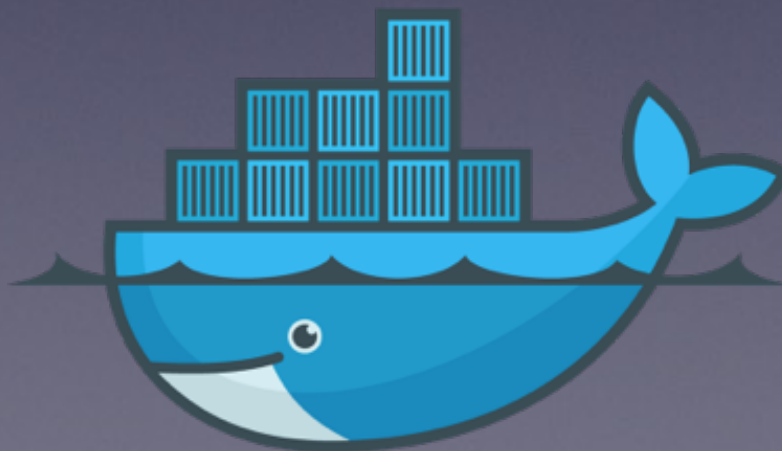
What is Docker ?

# What is Docker ?

Container is so great! is so cool! But...

Here are some new problems:

- Where to get system images ?
- How to control images versions ?
- How to manage different containers ?
- ... ..



# What is Docker ?



Docker is an open platform for developers and sysadmins to build, ship, and run distributed applications, whether on laptops, data center VMs, or the cloud.

— docker.io

Why is Docker so popular ?



# Why is Docker so popular ?

- For developer: I have a dream
  - hope focusing on program logic and code itself
  - free running environment
  - unlimited resources(like middleware, software, etc.)
- For deployer: I have a dream
  - hope focusing on easier maintenance
  - no error, no repeat problems
  - less time consume, easier deploy





# Why is Docker so popular ?

- Static application environment = more reliable
- No stress deployment and update



# Why is Docker so popular ?

- Repeatable, runnable artifact = portability
- Develop here, run everywhere



# Why is Docker so popular ?

- Loosely coupled = easier to build and manage
- Mix in and extend third party services





# Why is Docker so popular ?

- Highly automatable = easier management
- Efficiency: optimized packing, better scaling
- Performance: active environment tuning
- Continuous integration: easy and reliable
- Robustness: active monitoring, self healing







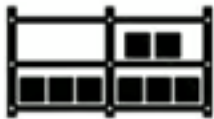







# A Comparison





# A Comparison

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# A Comparison



# A Comparison

## Static website

nginx 1.5 + modsecurity + openssl +  
bootstrap 2

## User DB

postgresql + pgv8 + v8

## Analytics DB

hadoop + hive + thrift + OpenJDK

## Queue

Redis + redis-sentinel

## Background workers

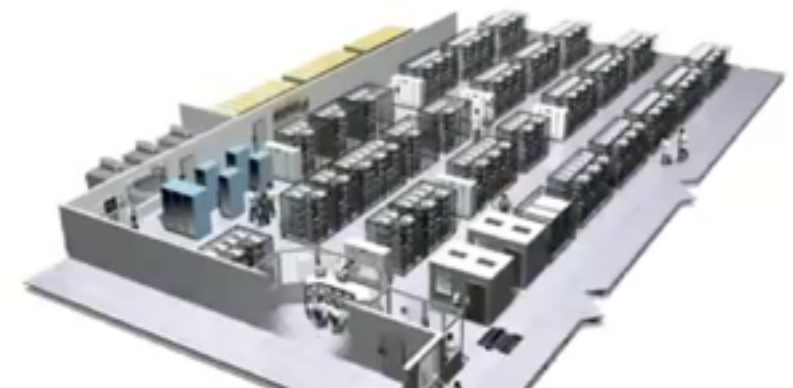
Python 3.0 + celery + pyredis + libcurl + ffmpeg  
+ libopencv + nodejs + phantomjs

## Web frontend

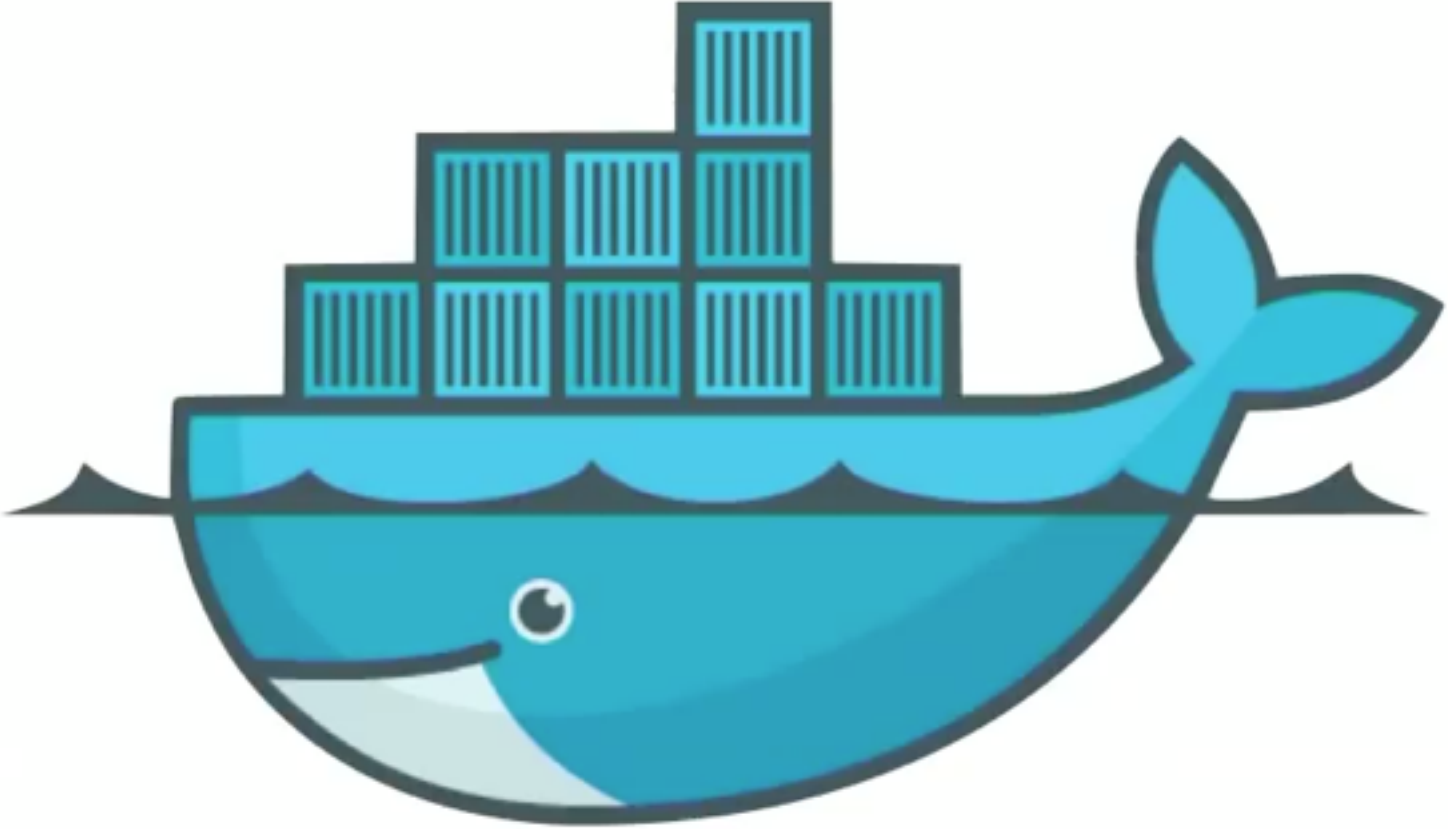






Ruby + Rails + sass + Unicorn

## API endpoint

Python 2.7 + Flask + pyredis + celery + psyco  
+ postgresql-client



# A Comparison

Static website						
Web frontend						
Background workers						
User DB						
Analytics DB						
Queue						
						



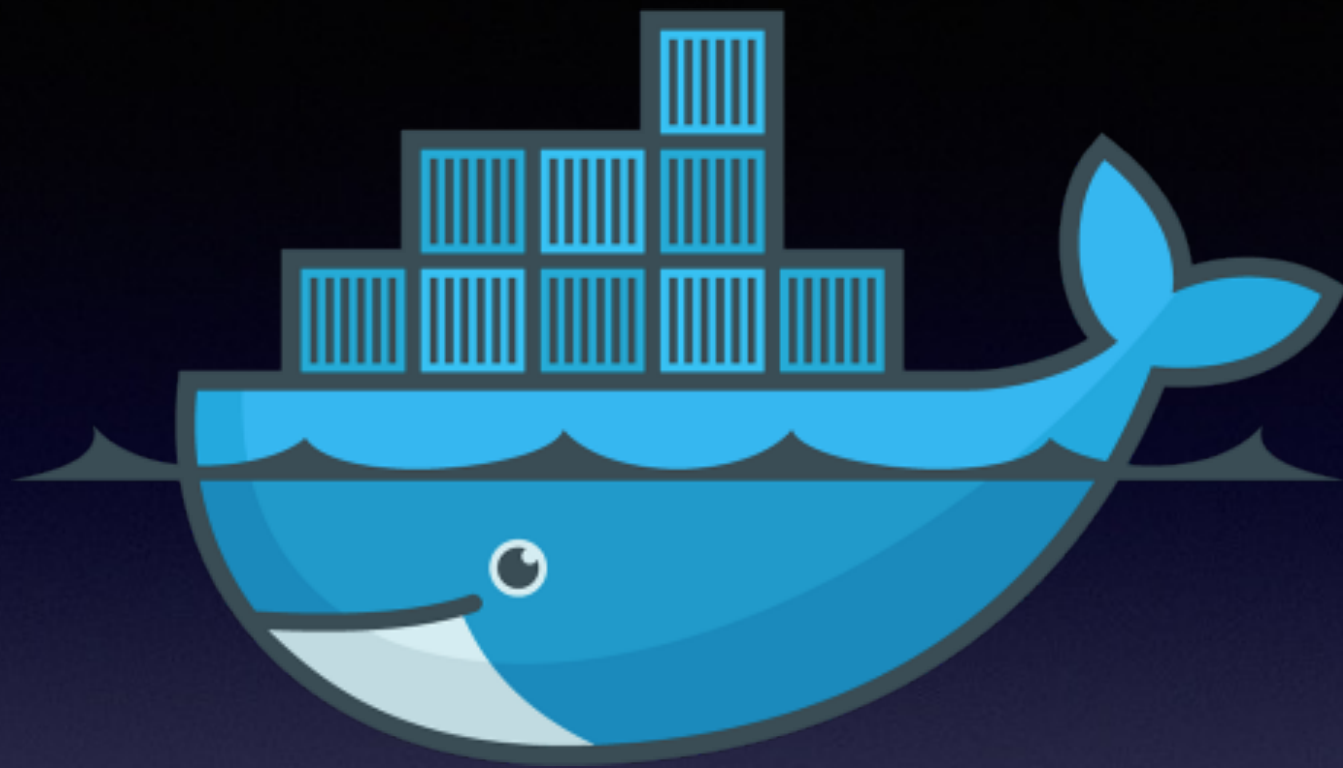
# Demo





# Topic Today

- What is container ?
- VM vs container
- What is docker ?
- Why is docker so popular ?



Thank you