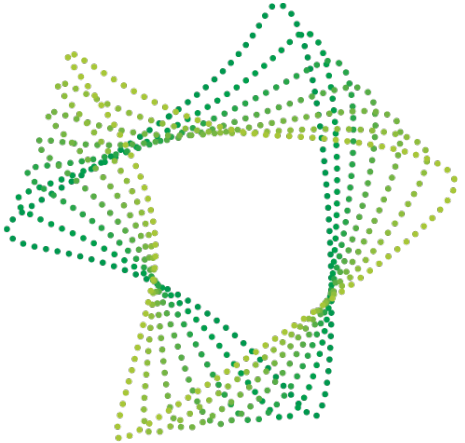
Working with Containers

(Docker Runtime)



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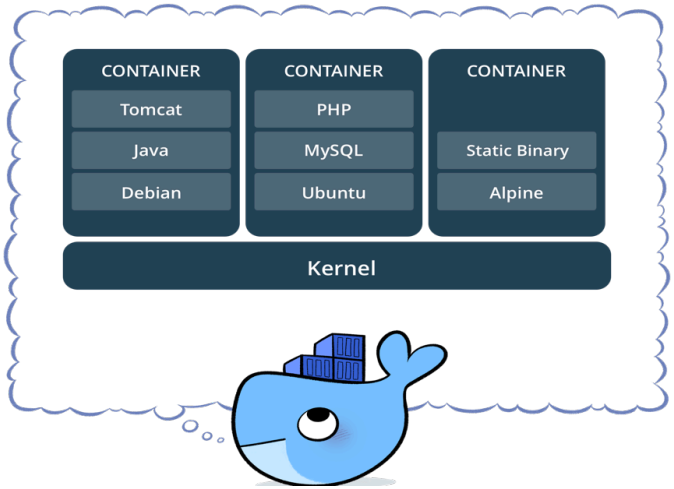
What are Containers



- Containers package code and dependencies (runtime, system tools, system libraries, settings) together and run as isolated processes.
- Multiple containers can run on the same machine and share the OS kernel with other containers.
- Available for both Linux and Microsoft Windows, containerized software will always run the same, regardless of the environment.
- Containers take up less compute & space than VMs and start almost instantly.

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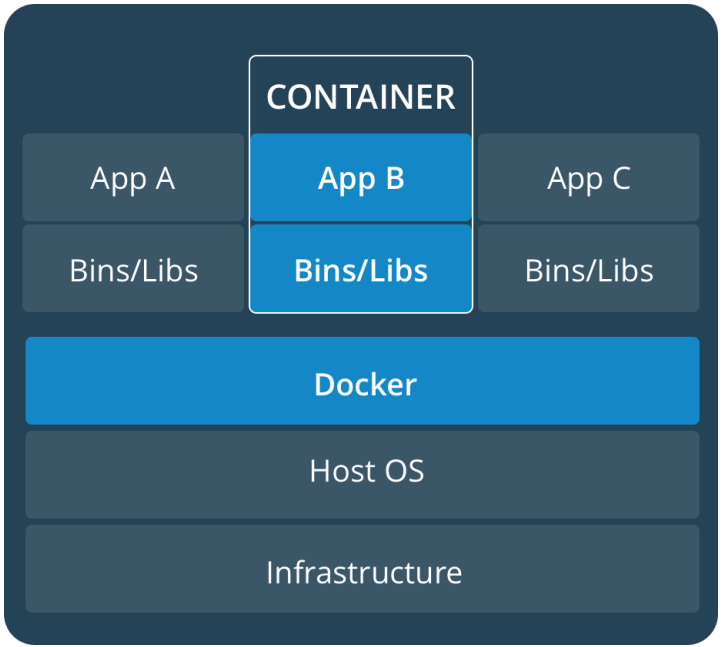
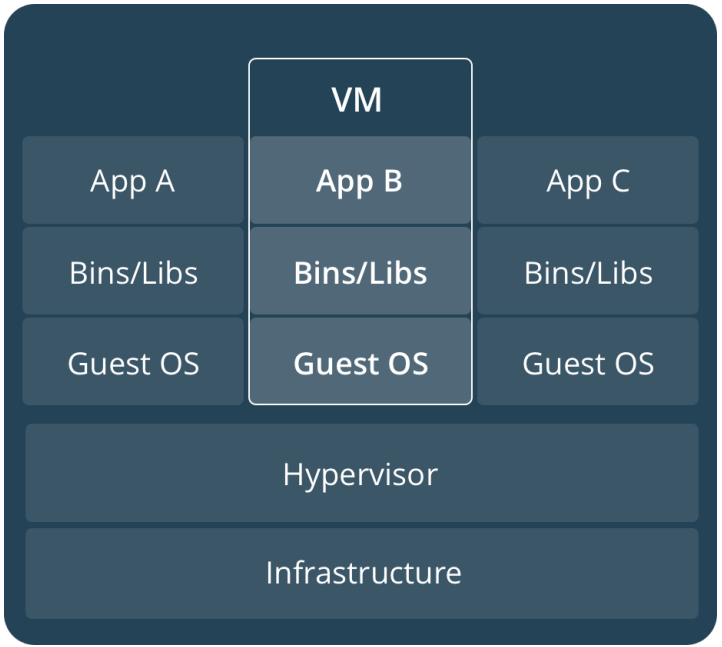
Containers vs. Virtual Machines



App level construct



Infra level construct

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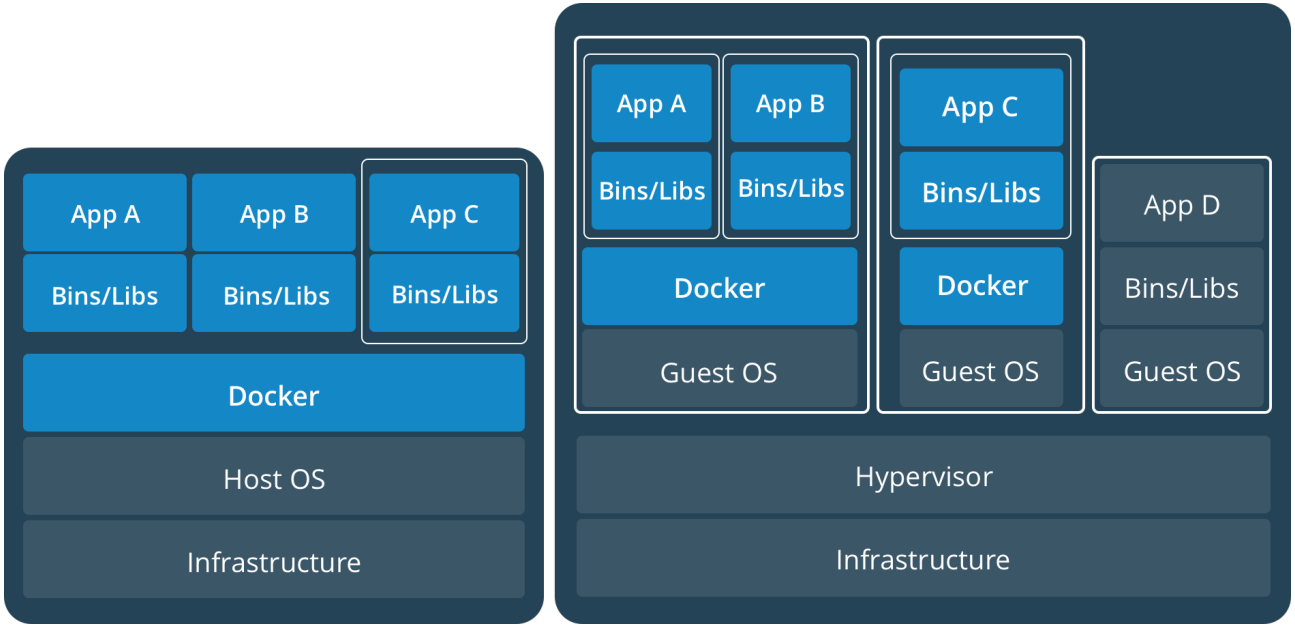
Containers and VMs together



Containers and VMs used together provide a great deal of flexibility in deploying and managing apps.

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Key benefits of Containers

- **Flexible**
  Even the most complex applications can be containerized.

- **Lightweight**
  Containers leverage and share the host kernel.

- **Speed**
  No OS reboot, applications online in seconds.

- **Interchangeable**
  You can deploy updates and upgrades on-the-fly.

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Benefits of Containers

- **Portable**
  You can build locally, deploy to the cloud, and run anywhere.

- **Scalable**
  You can increase and automatically distribute container replicas.

- **Stackable**
  You can stack services vertically and on-the-fly.

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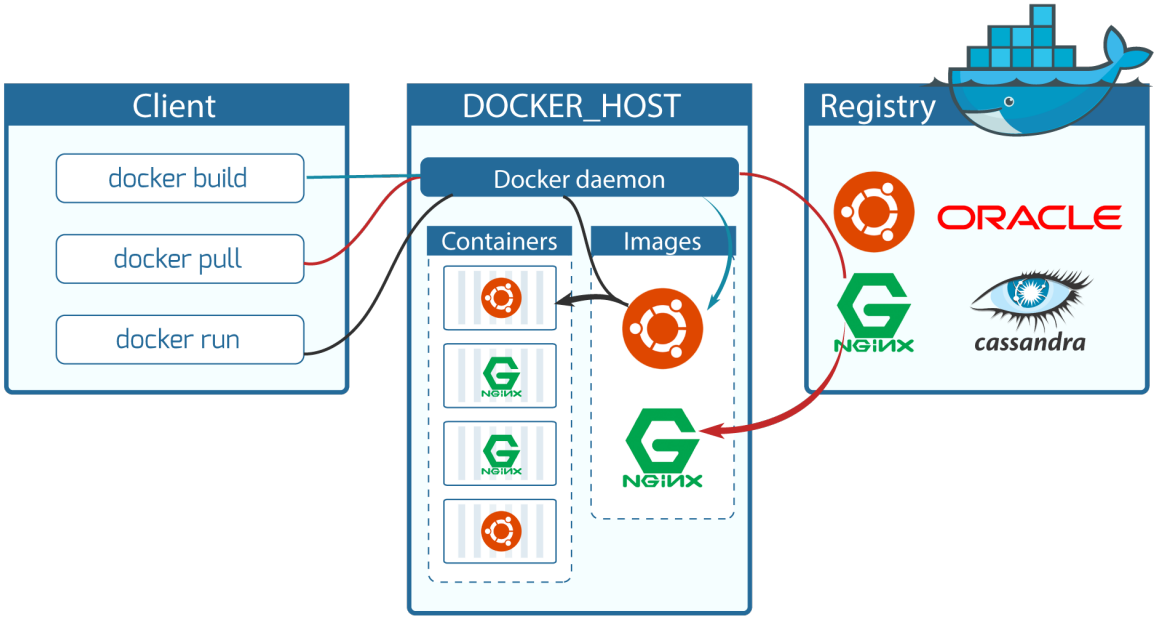
Docker Architecture



Docker is a platform for developers and sysadmins to develop, deploy, and run applications with containers.

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Docker basics

- Image

  An image is an executable package that includes everything needed to run an application--the code, a runtime, libraries, environment variables, and configuration files.

- Container

  A container is a runtime instance of an image--what the image becomes in memory when executed (that is, an image with state, or a user process).

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Docker basics

- Dockerfile

  Dockerfile is a text document that contains all the commands to assemble an image. Docker daemon can build images automatically by reading the instructions from a Dockerfile.

```
FROM node:latest
COPY . /usr/src/app
WORKDIR /usr/src/app
RUN npm install
EXPOSE 3000
CMD npm start
```


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Workshop

- **Setup Developer Environment**
  https://www.govtechstack.sg/workshops/containers/ → PRE-WORKSHOP PREP

- **Working with Containers**
  https://www.govtechstack.sg/ → Training Materials → NECTAR:Containers

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