1. Orientation and setup

Docker concepts

Docker is a platform for developers and sysadmins to **develop, deploy, and run** applications with containers. The use of Linux containers to deploy applications is called *containerization*. Containers are not new, but their use for easily deploying applications is.

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Containerization is increasingly popular because containers are:

- **Flexible**: Even the most complex applications can be containerized.
- **Lightweight**: Containers leverage and share the host kernel.
- **Interchangeable**: You can deploy updates and upgrades on-the-fly.
- **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.

Images and containers

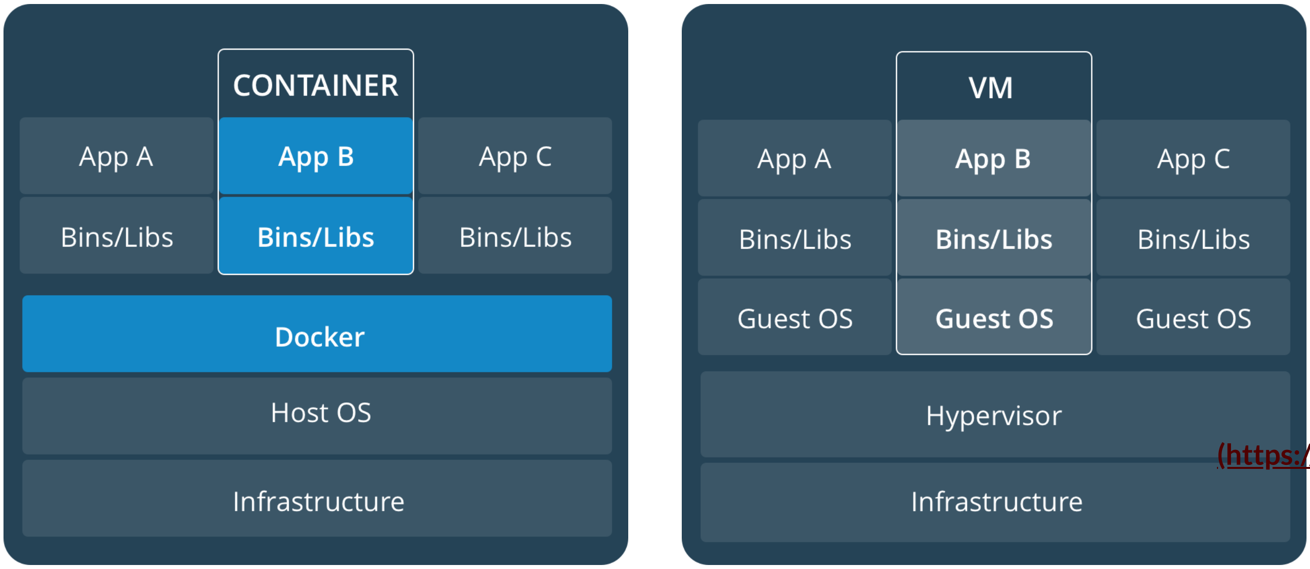
A container is launched by running an image. An **image** is an executable package that includes everything needed to run an application—the code, a runtime, libraries, environment variables, and configuration files.

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). You can see a list of your running containers with the command, `docker ps`, just as you would in Linux.

Containers and virtual machines

A **container** runs *natively* on Linux and shares the kernel of the host machine with other containers. It runs a discrete process, taking no more memory than any other executable, making it lightweight.

By contrast, a **virtual machine** (VM) runs a full-blown “guest” operating system with *virtual* access to host resources through a hypervisor. In general, VMs provide an environment with more resources than most applications need.



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Prepare your Docker environment

Install the most recent stable version of **Docker Desktop** **(https://www.docker.com/products/docker-desktop)** for your OS.

Test Docker version

1. Run `docker --version` and ensure that you have a supported version of Docker:

```
docker --version

Docker version 19.03.13, build 4484c46d9d
```

2. Run `docker info` (or `docker version` without `--`) to view even more details about your Docker installation:

```
docker info
Client:
 Debug Mode: false
Server:
 Containers: 6
  Running: 0
  Paused: 0
  Stopped: 6
 Images: 4
 Server Version: 19.03.13
```

```
Storage Driver: overlay2
...
```

NOTE: To avoid permission errors (and the use of `sudo`), add your user to the `docker` group.

Test Docker installation

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1. Test that your installation works by running the simple Docker image, **hello-world (https://hub.docker.com/_/hello-world/)** :

```
docker run hello-world

Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
ca4f61b1923c: Pull complete}
Digest: sha256:ca0eeb6fb05351dfc8759c20733c91def84c...
Status: Downloaded newer image for hello-world:latest


Hello from Docker!
This message shows that your installation appears to be
working correctly.
...
```

2. List the `hello-world` image that was downloaded to your machine:

```
docker image ls
```

3. List the `hello-world` container (spawned by the image) which exits after displaying its message. The container isn't running, so you'll need to use the `--all` option to force Docker to show it in the list. f it were still running, you would not need the `--all` option:

```
docker container ls --all
```

```
CONTAINER ID    IMAGE         COMMAND     CREATED           STATUS
54f4984ed6a8    hello-world   "/hello"    20 seconds ago    Exited (0) 19 seconds ago
```

Recap and cheat sheet

[(https://getliner](https://getliner)

```
## List Docker CLI commands
docker
docker container --help

## Display Docker version and info
docker --version
docker version
docker info

## Execute Docker image
docker run hello-world

## List Docker images
docker image ls

## List Docker containers (running, all, all in quiet mode)
docker container ls
docker container ls --all
docker container ls -aq
```

Conclusion of part one

Containerization makes **CI/CD** **(https://en.wikipedia.org/wiki/CI/CD)** seamless. For example:

- applications have no system dependencies
- updates can be pushed to any part of a distributed application
- resource density can be optimized.

With Docker, scaling your application is a matter of spinning up new executables, not running heavy VM hosts.

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