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IT SOLUTIONS

Backend development Class 02, Series 03

Docker

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CLASS 02

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What is Docker?

Docker is an open source platform for building, deploying, and managing containerized applications.

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What is Docker?

- It enables developers to package applications into containers—standardized executable components combining application source code with the operating system (OS) libraries and dependencies required to run that code in any environment.
- Developers can create containers without Docker, but the platform makes it easier, simpler, and safer to build, deploy and manage containers.

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What are containers?

A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another.

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How containers work?

- Containers are made possible by process isolation and virtualization capabilities built into the Linux kernel. These capabilities - such as control groups (Cgroups) for allocating resources among processes, and namespaces for restricting a processes access or visibility into other resources or areas of the system - enable multiple application components to share the resources of a single instance of the host operating system in much the same way that a hypervisor enables multiple virtual machines (VMs) to share the CPU, memory and other resources of a single hardware server.

Additional advantages of Containers

- **Lighter weight:** Unlike VMs, containers don't carry the payload of an entire OS instance and hypervisor; they include only the OS processes and dependencies necessary to execute the code.
- **Greater resource efficiency:** With containers, you can run several times as many copies of an application on the same hardware as you can using VMs.
- **Improved developer productivity:** Compared to VMs, containers are faster and easier to deploy, provision and restart. This makes them ideal for use in continuous integration and continuous delivery **(CI/CD)** pipelines.

Why use Docker?

Docker enhanced the native Linux containerization capabilities with technologies that enable:

- **Improved—and seamless—portability:** Docker containers run without modification across any desktop, data center and cloud environment.
- **Even lighter weight and more granular updates:** With Docker containers, only one process can run in each container. This makes it possible to build an application that can continue running while one of its parts is taken down for an update or repair.
- **Automated container creation:** Docker can automatically build a container based on application source code.

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Why use Docker?

- **Container versioning:** Docker can track versions of a container image, roll back to previous versions, and trace who built a version and how. It can even upload only the deltas between an existing version and a new one.
- **Container reuse:** Existing containers can be used as base images—essentially like templates for building new containers.
- **Shared container libraries:** Developers can access an open-source registry containing thousands of user-contributed containers.

DockerFile

Every Docker container starts with a simple text file containing instructions for how to build the Docker container image.

DockerFile automates the process of Docker image creation. It's essentially a list of command-line interface (CLI) instructions that Docker Engine will run in order to assemble the image.

DockerFile Example

```
# syntax=docker/dockerfile:1
FROM node:12-alpine
RUN apk add --no-cache python2 g++ make
WORKDIR /app
COPY . .
RUN yarn install --production
CMD ["node", "src/index.js"]
EXPOSE 3000
```

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Docker images

Docker images contain executable application source code as well as all the tools, libraries, and dependencies that the application code needs to run as a container. When you run the Docker image, it becomes one instance (or multiple instances) of the container.

Docker containers

Docker containers are the live, running instances of Docker images. While Docker images are read-only files, containers are live, ephemeral, executable content.

Users can interact with them, and administrators can adjust their settings and conditions using docker commands.

Docker Hub

Docker Hub is the public repository of Docker images that calls itself the “world’s largest library and community for container images.”

It holds over 100,000 container images sourced from commercial software vendors, open-source projects, and individual developers.

Docker daemon

Docker daemon is a service running on operating system, such as Microsoft Windows or Apple MacOS or iOS.

This service creates and manages your Docker images for you using the commands from the client, acting as the control center of your Docker implementation.

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Docker compose

If you’re building an application out of processes in multiple containers that all reside on the same host, you can use Docker Compose to manage the application’s architecture.

Docker Compose creates a **YAML** file that specifies which services are included in the application and can deploy and run containers with a single command.

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Thank you!

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