



CLOUD COMPUTING APPLICATIONS

Docker Orchestration: Compose and Stack
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Infrastructure as Code

- Imperative
 - Tell the system exactly how to do things
 - `$ docker network create -d overlay my-network`
 - `$ docker container create --name web-service --publish 80:80 --network my-network nginx:latest`
 - `$ docker container create --name db-service --network my-network --volume /usr/bin:/usr/local/bin mysql:latest`
 - ...
- Declarative
 - Tell the system what you want to be achieved

Docker Compose

- The main tool by Docker for container orchestration
- Uses YAML file format by default
- The default file name is `docker-compose.yml`
- Declarative way
 - You tell docker-compose what your implementation looks like, it figures out the operations to make it happen

Imperative vs. Declarative

```
$ docker network create -d overlay my-network
$ docker container create --name web-service
--publish 80:80 --replicas 3 --network my-network
nginx:latest
$ docker container create --name db-service
--replicas 1 --network my-network
--volume /usr/bin:/usr/local/bin
mysql:latest
```

```
version: "3.9"
service:
  web-service:
    image: nginx:latest
    ports: "80:80"
    deploy:
      replicas: 3
    networks:
      front-end
  ...
networks:
  front-end:
```

Compose Specification

- Compose Application Model
- Formalizes many of the concepts we have covered
 - Service
 - Network
 - Volume
 - Config
 - Secret
- <https://github.com/compose-spec/compose-spec/blob/master/spec.md>

Compose

- The most basic deployment model is docker-compose, running in one machine, and deploying multiple containers
- Docker Swarm is the distributed multi-host extension
- Same compose specification

Compose versions

- Version 1 was only for single host deployment
 - No Volumes, no Networks, no Build arguments
- Version 2
 - Support for Volumes, Networks and Build added
 - `depends-on` to indicate startup order
- Version 3
 - Targets both single host (docker-compose) and Swarm mode stacks
 - Added secrets
- <https://docs.docker.com/compose/compose-file/compose-versioning>