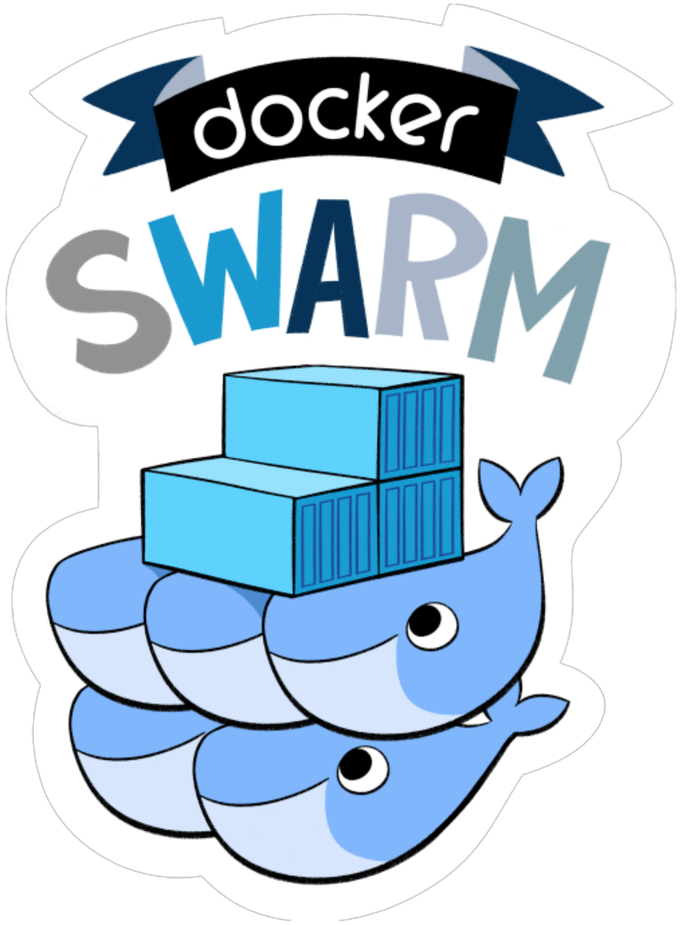


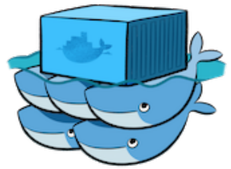
Docker *Swarm Mode*

Learn and Share

Clarence Bakirtzidis 12/08/2016

Image credit: http://blog.arungupta.me/wp-content/uploads/2015/11/docker-swarm-logo.png

What is a Docker swarm?



- A group of Docker Hosts arranged in a cluster
- Allows for deployment of containers into the cluster without necessarily caring about which specific hosts these containers run on (see: “pets vs. cattle”)
- Docker 1.11 and earlier had no built in swarm capability
- A separate component, “Docker Swarm”, could be used in conjunction with a group of Docker hosts to turn them into a swarm

What is Docker “swarm mode”?

- *“Docker Engine 1.12 includes swarm mode for natively managing a cluster of Docker Engines called a Swarm. Use the Docker CLI to create a swarm, deploy application services to a swarm, and manage swarm behavior.”* [1]

- Differences to the previous Docker Swarm include:

  - Swarm mode is built-in to the Docker Engine and is simpler to setup

  - Implements desired state reconciliation with better failure handling

  - Built-in load-balancing of service instances with DNS service discovery

  - Supports rolling updates for services

  - *Service* is a first-class construct in the Docker Engine

  - Secure by default (automatic TLS mutual authentication and encryption between nodes)

[1] https://docs.docker.com/engine/swarm

Old Docker Swarm Architecture

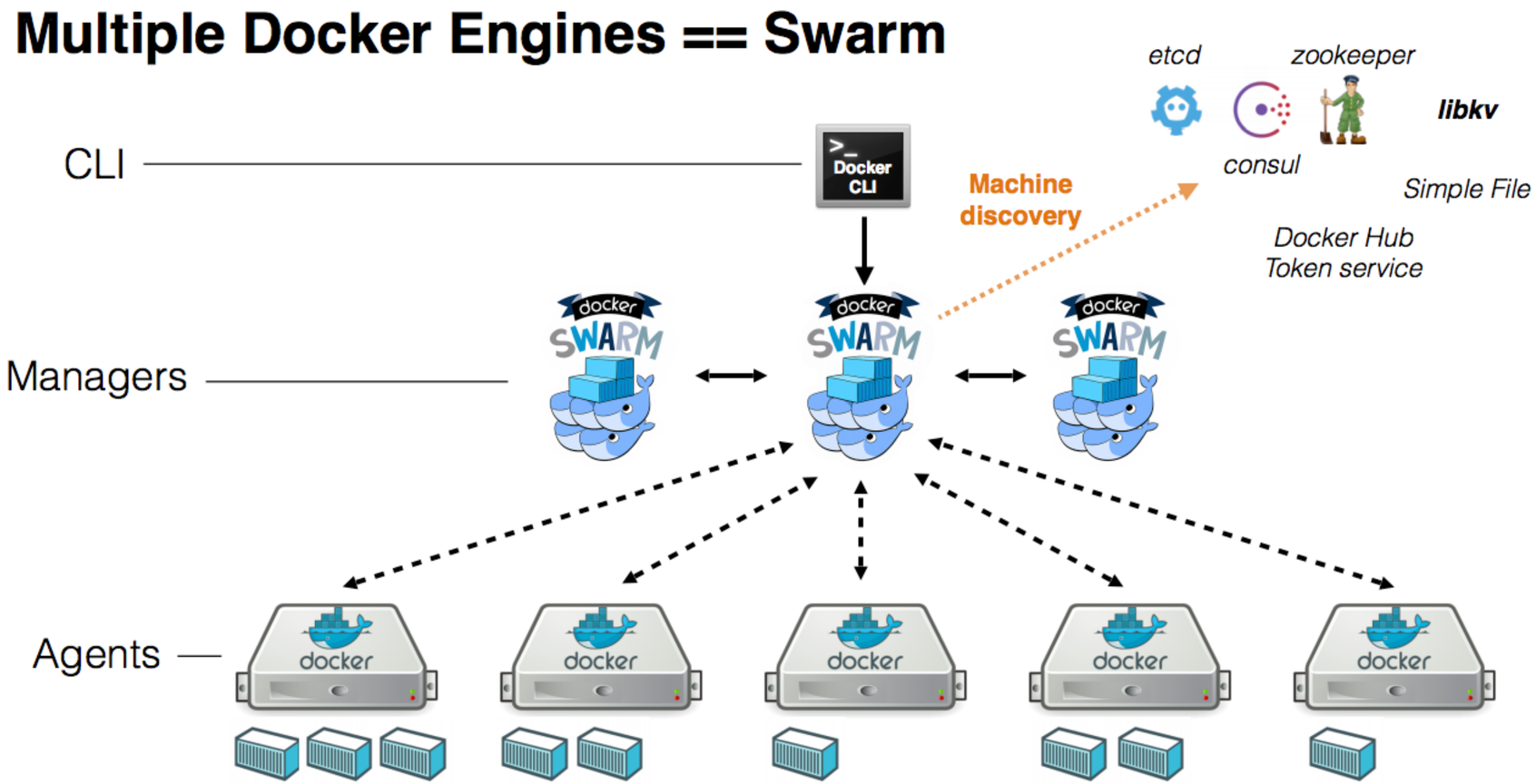
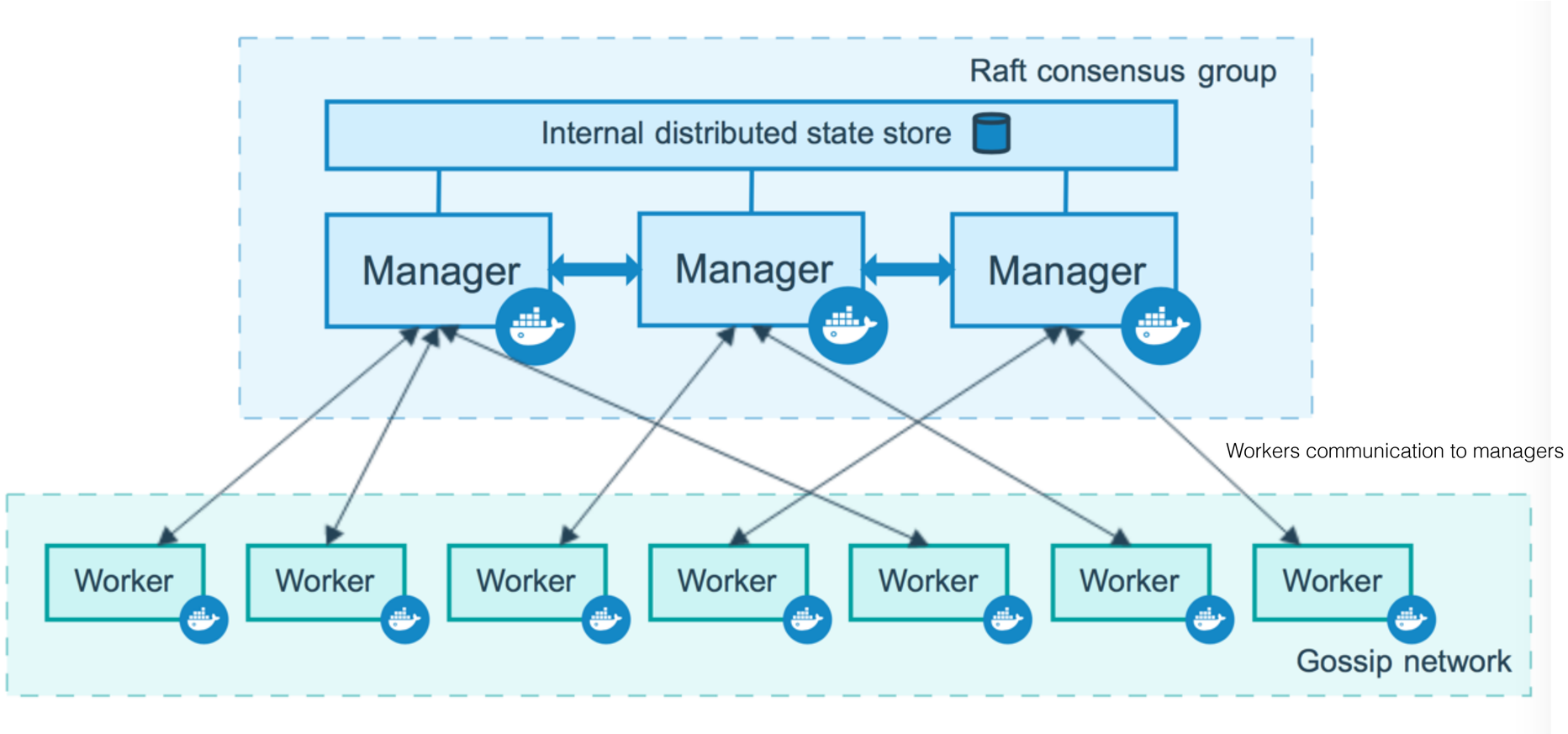


Image Credit: http://www.slideshare.net/Docker/docker-online-meetup-28-productionready-docker-swarm (by Alexandre Beslic)

Swarm Mode Architecture



Workers communication to managers is over gRPC (HTTP/2 based)

Image Credit: https://docs.docker.com/engine/swarm/images/swarm-diagram.png

Swarm mode concepts

- Nodes
  - Managers
  - Workers
- Services
  - Replicated (*N* tasks distributed throughout cluster)
  - Global (one task per host)

Swarm mode concepts

- Tasks
  - the atomic unit of scheduling within a swarm
  - a task is “slot” where the scheduler places a container
  - Task lifecycle goes one way (not recreated after termination)
- Containers
  - an isolated process that runs your app/microservice code

Service scheduling example

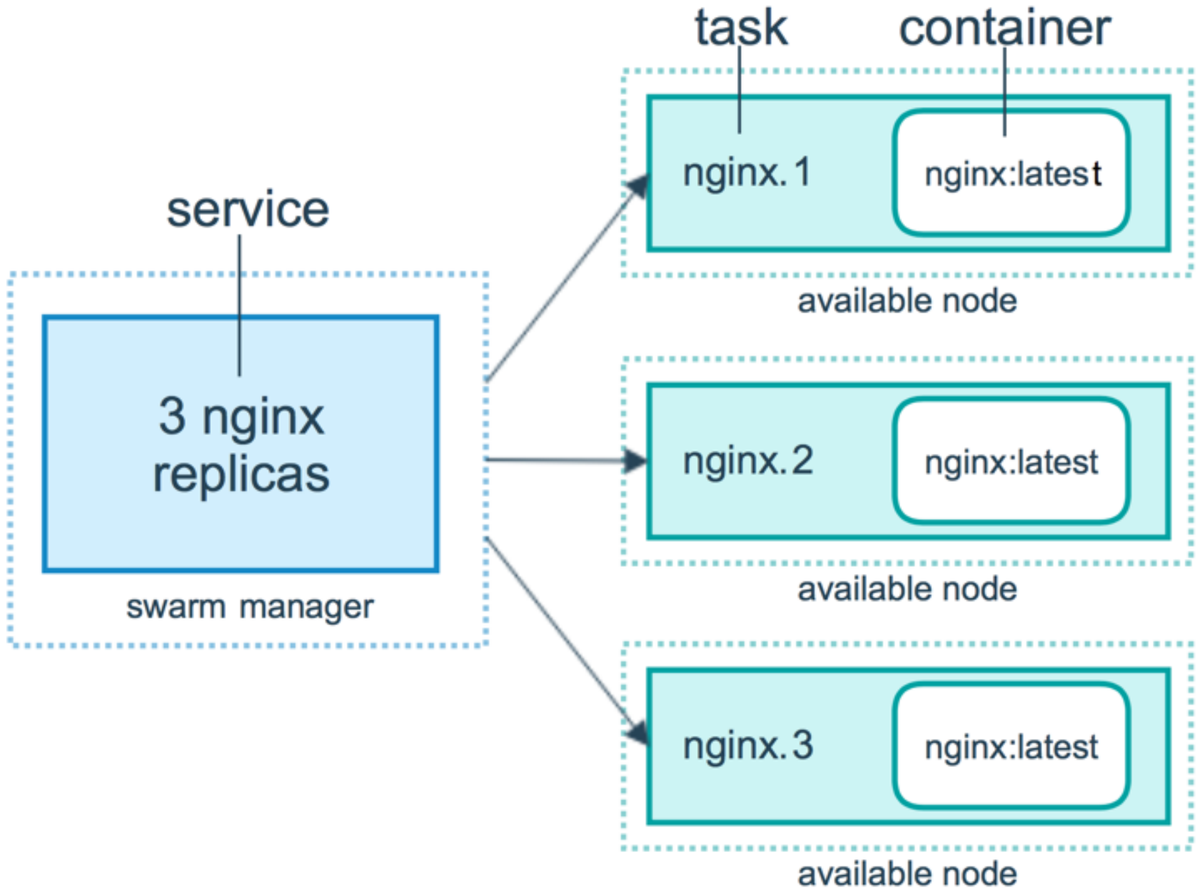


Image Credit: https://docs.docker.com/engine/swarm/images/services-diagram.png

Creating a swarm

- Docker CLI includes new commands:
- `docker swarm init …`
  - Initialise the first manager (activate swarm mode)
- `docker swarm join …`
  - Add additional managers or workers to the swarm

Managing swarm nodes

- `docker node [promote|demote] …`
- `docker node rm …`
- `docker node ps …`
- `docker node update …`

Deploying services to the swarm

- `docker service create [--replicas n] [—mode replicated|global] …`
- `docke service inspect …`
- `docker service ls …`
- `docker service rm …`
- `docker service ps …`

Scaling and updating services

- `docker service scale SERVICE=REPLICAS [SERVICE=REPLICAS...]`
- `docker service update …`

Maintenance support

- Docker swarm mode supporting rolling updates
  - Stop the first task
  - Schedule update for the stopped task
  - Start the container for the updated task
  - Configurable update failure action (pause, continue)
- Nodes (managers or workers) can be put into DRAIN availability
  - Gracefully shuts down tasks and prevents future tasks from being schedule on node
  - Creates new tasks on other available node(s) to satisfy desire state for service

Handling failures

- **Failed tasks**
  - New tasks are automatically created on other available node(s)
- **Failed nodes**
  - **Manager**
    - New leader is elected if quorum of more than half of the manager nodes are available
    - Manually create a new manager or promote a worker to a manager
    - New tasks are automatically created on other available node(s)
  - **Worker**
    - New tasks are automatically created on other available node(s)

Demo

- https://github.com/clarenceb/swarmmode-dojo

Other features

- Distributed Application Bundles (DAB)
  - Experimental feature in 1.12
  - Can create via Compose 1.8: `docker-compose build`
  - Deploy DAB via: `docker stack deploy`

The End

- **Next steps**
  - Try out the Swarm mode tutorial at: https://docs.docker.com/engine/swarm/swarm-tutorial/