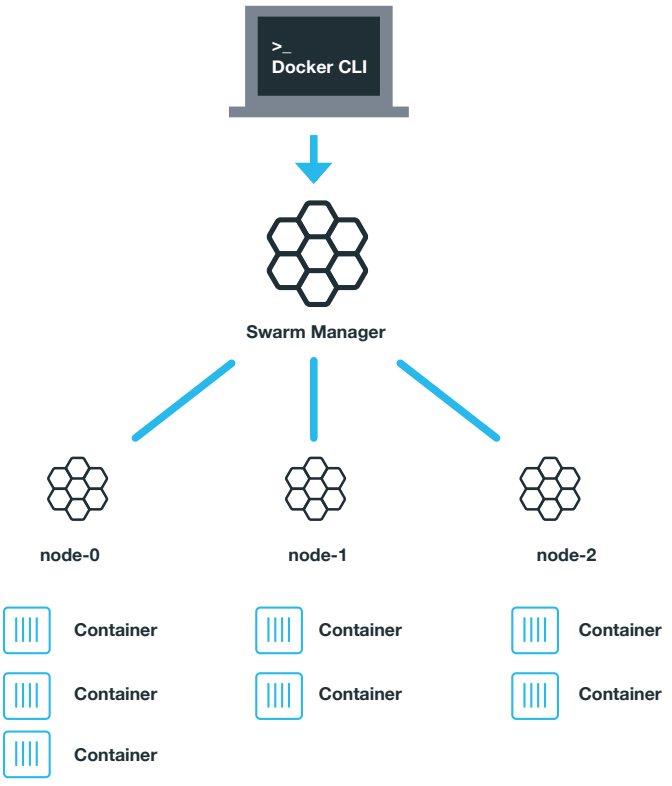
Technical Brief

Docker Swarm

Production scale clustering and container scheduling for Docker

The world's most innovative companies are adopting microservices architectures, where loosely coupled together services from applications. This introduces new complexity, with multiple services now having to be managed and has led to the adoption of containerization within the enterprise. Enterprises looking build, ship and run Dockerized applications at scale require operational tools to manage their resources and containers. Docker provides end-to-end integrated orchestration capabilities from automated host provisioning and host clustering to multi container application definition and container scheduling.

Docker Swarm is an orchestration tool providing clustering and scheduling capabilities for IT operations teams. Instead of having to communicate with each Docker Engine directly to build and run containers, you can cluster together Docker Engines into a single "virtual engine" that pools their resources together and communicate with a single Swarm master to execute commands. With flexible scheduling policies, IT teams gain control of how best to manage the host resources available to the running application containers.



High Performance at Any Scale

When it comes to Docker Engine clustering and container scheduling for the enterprise, scalability is key. Enterprises of all sizes, from five to a thousand servers can leverage Swarm in their environment. Swarm's scalability has been tested up to 1,000 nodes with 50,000 deployed containers with sub second container startup times. This is done with no performance degradation.

Flexible Container Scheduling

Swarm helps IT operations teams maximize performance and resource utilization within their environment. Swarm's built-in scheduler comes within several different filters out of the box. These filters include: node tags, affinity and several container deployment strategies like binpack, spread, random and several others. For instance, if an IT team wants to minimize their footprint they can use binpack, which loads each node to its maximize capacity before deploying to another. Spread enables teams to evenly deploy containers across their various nodes for a balanced strategy. Random allows teams to randomly deploy to nodes within a cluster. This flexibility allows IT operations teams to select the strategies that work best for their particular environment.

Continuous Availability of Services

The service level agreements that enterprises maintain with their internal and external customers demand high availability of their application environments. Downtime not only results in complaints but also potentially lost revenue. Docker Swarm provides high availability of the Swarm Manager by creating multiple Swarm masters and specifying policies for leader election in case the primary master node goes down. If a Master fails, a slave node is then promoted to master until the original master comes back

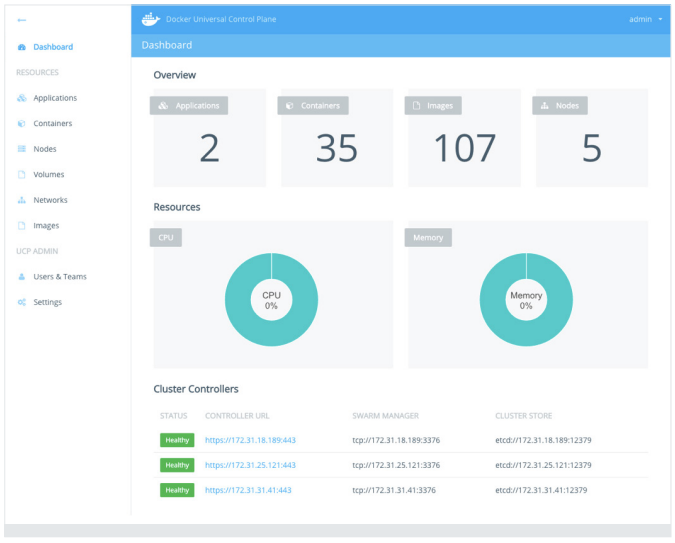
up. Additionally if a node fails to join a cluster, Swarm will continue to try and join, provide an error alert and logs. In the event of node failure, Swarm now provides experimental support for rescheduling containers on healthy nodes.

```
REPOSITORY            TAG                 IMAGE ID            CREATED             VIRTUAL SIZE
dockercoins_worker    latest              687f44b8451b        45 minutes ago      696.3 MB
dockercoins_webui     latest              1f4daec82a64        46 minutes ago      646.9 MB
dockercoins_hasher    latest              66803b001b8c        47 minutes ago      746.8 MB
node                  latest              3a18b51160d3        5 days ago          643.1 MB
python                latest              d44a99ced7b9        12 days ago         689.1 MB
ruby                  latest              1184307cf3e0        2 weeks ago         721.8 MB
Atuls-MacBook-Pro:~ mikecoleman$ docker-machine ls
NAME         ACTIVE   URL          STATE     URL                         SWARM              DOCKER    ERRORS
master       -        virtualbox   Running   tcp://192.168.99.101:2376   master (master)    v1.9.1
newmachine   -        virtualbox   Running   tcp://192.168.99.108:2376                      v1.9.1
node1        -        virtualbox   Running   tcp://192.168.99.107:2376                      v1.9.1
node2        -        virtualbox   Running   tcp://192.168.99.106:2376                      v1.9.1
node3        *        virtualbox   Running   tcp://192.168.99.105:2376                      v1.9.1
node-0       -        virtualbox   Running   tcp://192.168.99.102:2376   master             v1.9.1
node-1       -        virtualbox   Running   tcp://192.168.99.103:2376   master             v1.9.1
node-2       -        virtualbox   Running   tcp://192.168.99.104:2376   master             v1.9.1
```

Compatibility with Docker APIs and Integrated Support

Swarm has full support for the Docker API meaning it provides a seamless experience for users using different Docker tools like Docker CLI, Compose, Trusted Registry, Hub and Universal Control Plane. Docker Swarm provides native support for key capabilities like multi-host networking and volume management for Dockerized applications. A Compose file built in development can be simply deployed (docker-compose up) to a testing server or Swarm cluster. Docker Swarm can pull and run images from both Docker Trusted Registry or Hub.

Enterprises looking to deploy and end-to-end integrated Docker application environment can look to Docker Universal Control Plane with embedded Swarm and Compose support into the management framework.



Learn about Docker Datacenter

Available as a subscription, Docker Datacenter is an integrated end-to-end suite including commercially supported Docker Engine, Universal Control Plane with embedded Swarm and Compose and Trusted Registry. Docker Datacenter provides an on-premises of VPC deployed Containers as a Service (CaaS) environment for developers and IT operations teams to collaborate on building, shipping and running distributed applications anywhere in the enterprise.

The Docker Datacenter subscription is available with two different support coverage windows. You can choose from Business Day Support which provides 12 hour cover during the business week or Business Critical Support for 24 hours by 7 days a week and 365 days a year.

Business Day Support	Business Critical Support
6am – 6pm PT, Monday - Friday	24 x 7 x 365
Docker Universal Control Plane	Docker Universal Control Plane
Docker Trusted Registry	Docker Trusted Registry
Docker Engine	Docker Engine

Interested in learning more about the Docker Datacenter subscription or in signing up for a free 30-day trial? Contact our Sales team at www.docker.com/contact or visit our website https://www.docker.com/pricing.

Additional Resources:

Get Swarm - https://docs.docker.com/swarm/
Contribute to Swarm - https://github.com/docker/swarm

www.docker.com

docker