How Containers Will Usher in a New Era of Cloud Computing

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@CloudExpo: Article

What is Cloud Computing?

The cloud is a virtualization of resources that maintains and manages itself

BY KEVIN HARTIG

JUNE 2, 2008 12:30 PM EDT

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Early Bird Special at Cloud Expo

June 2, 2008 - Cloud computing is becoming one of the next industry buzz words. It joins the ranks of terms including: grid computing, utility computing, virtualization, clustering, etc.

Cloud computing overlaps some of the concepts of distributed, grid and utility computing, however it does have its own meaning if contextually used correctly.

The conceptual overlap is partly due to technology changes, usages and...
CloudStack customers
But we did not achieve our goal
Public IaaS becoming a winner-takes-all market

VMware owns enterprise private cloud, scale-out private cloud remains a niche
Cloud IaaS is not a commodity.

Lydia Leong, Gartner
Growth of Docker

- Early 2015: 100M downloads
- Nov 2015: 1B downloads
- June 2016: 4B downloads
RancherOS size breakdown

42MB

- 8.4MB: File system and tools
- 13.7MB: User Docker (upstream Docker)
- 4MB: System Docker
- 11.7MB: Kernel drivers
- 4.2MB: Kernel core
A container technology stack is forming
Container in VM

KVM/Hyper-V/VMware

VM in Container

KVM
Kubernetes on OpenStack

OpenStack on Kubernetes (Stacknetes)
Containers are not VMs, but there are a lot of parallels
Especially in how they deal with storage and networking
<table>
<thead>
<tr>
<th>Neutron</th>
<th>CNI</th>
<th>libnetwork</th>
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<tbody>
<tr>
<td>Cinder</td>
<td>Flexvolume</td>
<td>Docker volume plugin</td>
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Double overlay problem

Container 1
10.42.34.203

VM1 192.168.100.2

docker0 bridge

CNI

VXLAN

Neutron

VXLAN

Neutron

OVS

Host1 23.65.120.31

Container2
10.42.46.21

VM2 192.168.100.5

docker0 bridge

CNI

OVS

Host2 23.65.130.42
OpenStack Kuryr
A simpler solution to double overlay problem
Flat container networking!

Container 1
10.42.34.203

VM1 192.168.100.2

docker0 bridge

CNI

Simple Layer-3 Routing

CNI

docker0 bridge

VM2 192.168.100.5

Container2
10.42.46.21

OVS

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Neutron

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Neutron

VXLAN

OVS
Latency measurements by technology\textsuperscript{1}

Source: Intel
docker run --device-read-bps /dev/sda:100mb myapp

docker run --device-write-iops /dev/sda:1000 myapp
A lot of VM and IaaS features are now being absorbed into container technology stack
Container Technology Stack

- Orchestration: Compose, Kubernetes, Marathon, Swarm, Kubernetes, Mesos, ...
- Scheduling: cAdvisor, Sysdig, Datadog, ...
- Monitoring: LDAP, AD, GitHub, SAML, ...
- Access Control: DockerHub, Quay.io, Artifactory...
- Registry: Docker, Rkt, Triton, VIC, ...
- Engine: Notary, Vault, ...
- Security: VXLAN, IPSEC, HAProxy, ...
- Network: Ceph, Gluster, Swift, ...
- Storage: Etcd, Consul, MongoDB, ...
- Distributed DB: Red Hat, Ubuntu, CoreOS, RancherOS, ...
- Container OS: AWS, VMware, OpenStack, ...
- Compute Resources:
Simpler
Smaller
Faster
More Secure
Easier to Operate
Browser: interchangeable desktop
Rancher: interchangeable IaaS
With containers, IaaS can become a commodity service
Thank you

rancher.com