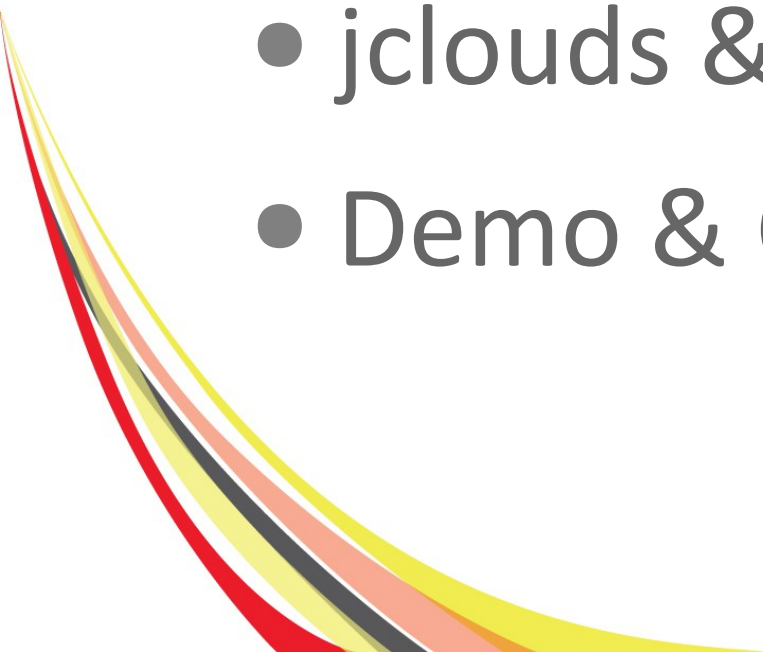


# Integration in the cloud - iPaaS with Fuse technology

Charles Moulliard  
Apache Committer

# Agenda

- Introduction & Key concepts
  - What is iPaaS ?
  - Fuse Fabric & Fuse Mngt Console
  - jclouds & Apache CloudStack
  - Demo & Conclusion
- 
- A decorative graphic in the bottom-left corner consisting of several overlapping, curved lines in red, yellow, and grey.

# Speaker : Charles Moulliard

- Engineer in Agronomy & Master in Zoology
- Solution Architect & Consultant @RedHat
- Committer → Karaf (PMC), Camel (PMC), ServiceMix, DeltaSpike, Fabric



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 Blog : <http://cmoulliard.blogspot.com>

 Slideshare : <http://www.slideshare.net/cmoulliard>

# Introduction



# What is the cloud

- Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet).
- Characteristics : Agility, Virtualization, Security, Performance, Reliability, Maintenance, Multitenancy

# IaaS

- IaaS : Provide computers/virtual machines or resources
- Virtual machines uses hypervisor (Xen, KVM, ...)



# PaaS

- Deliver a computing platform typically including operating system, programming language, execution environment, database, web server, ...



# SaaS

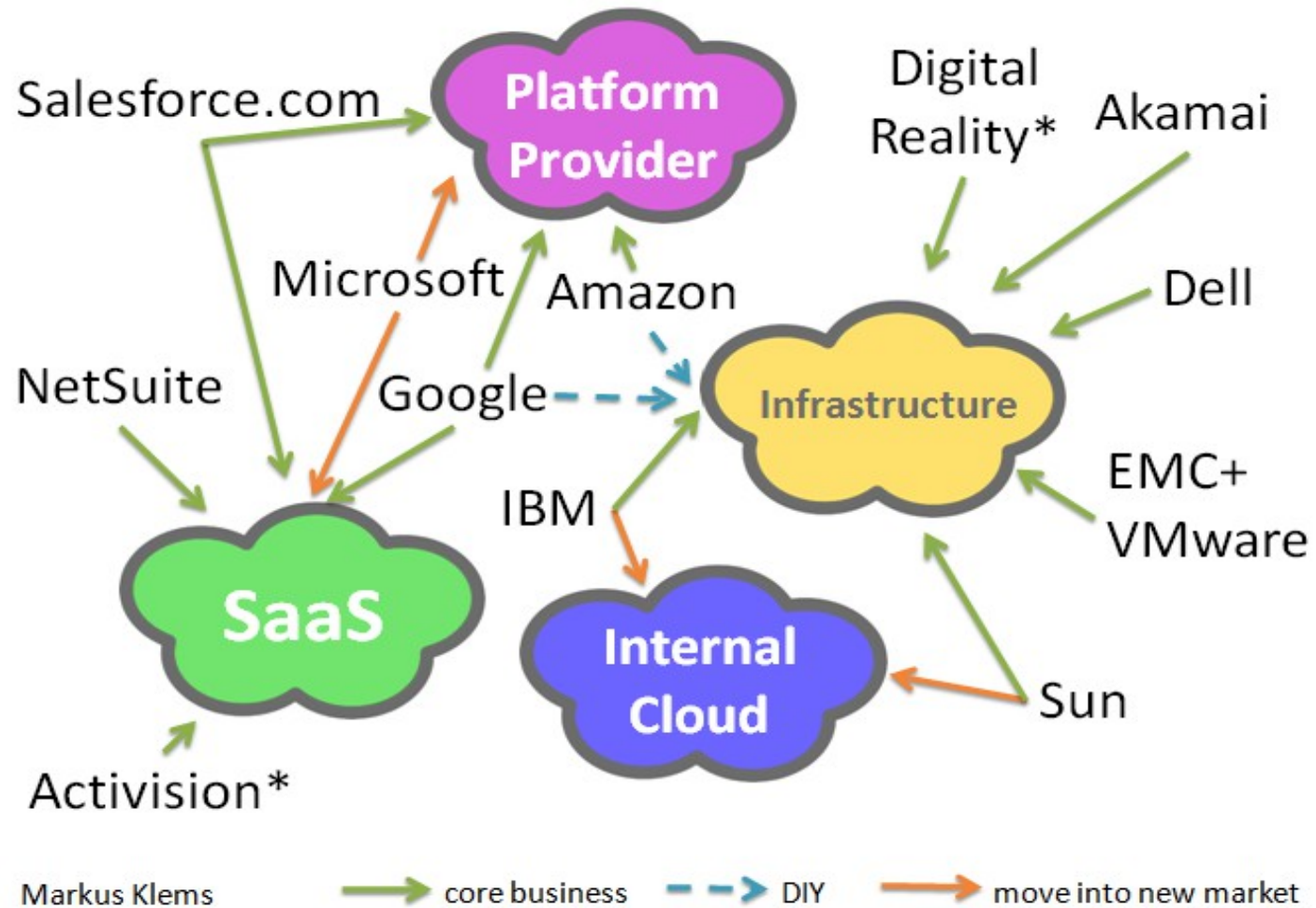
- Install and operate application software in the cloud and cloud users access the software from cloud clients.





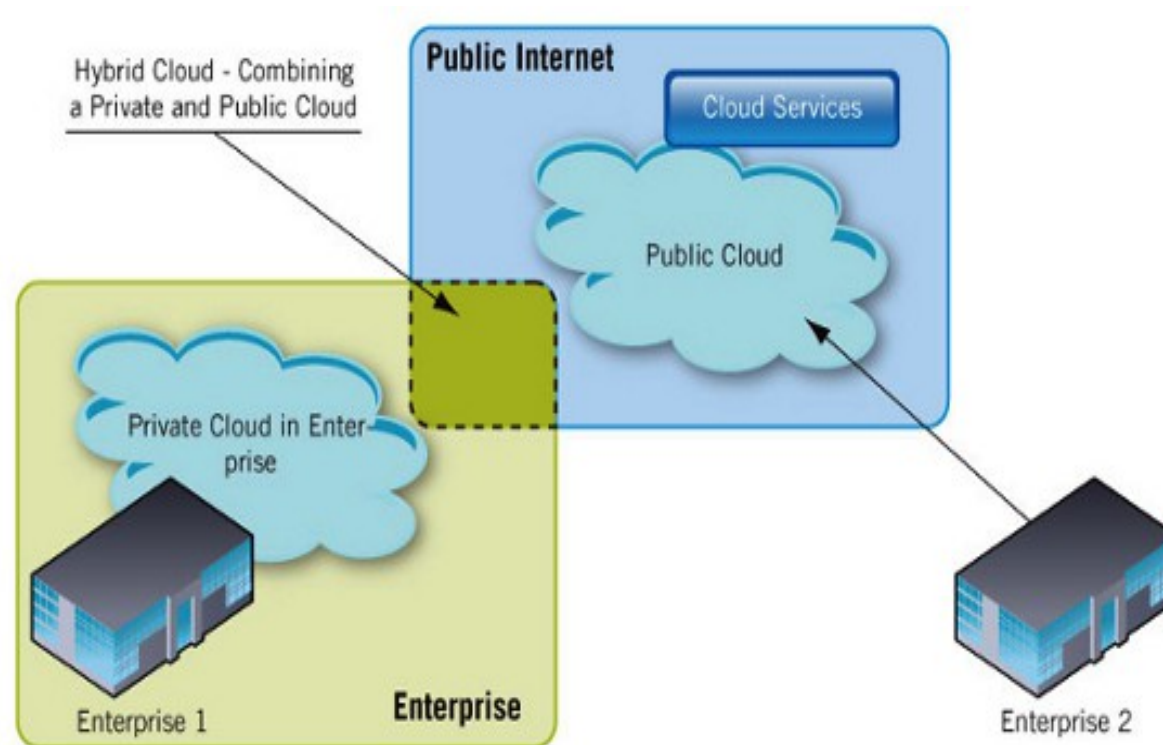
# All together

- Can we resume ?



# Deployment models

- Public / Hybrid / Private
- Is it different from Extranet/Intranet ...



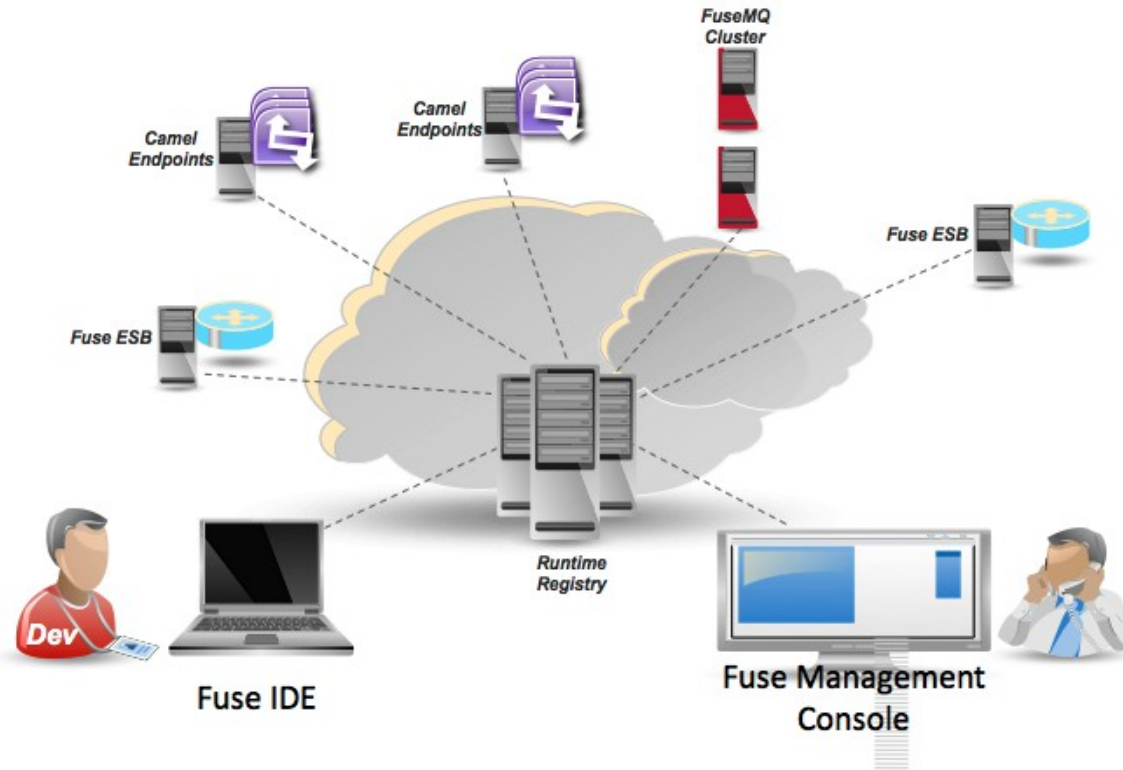
# iPaaS

“A new paradigm or simply a  
easiest way to deploy projects”



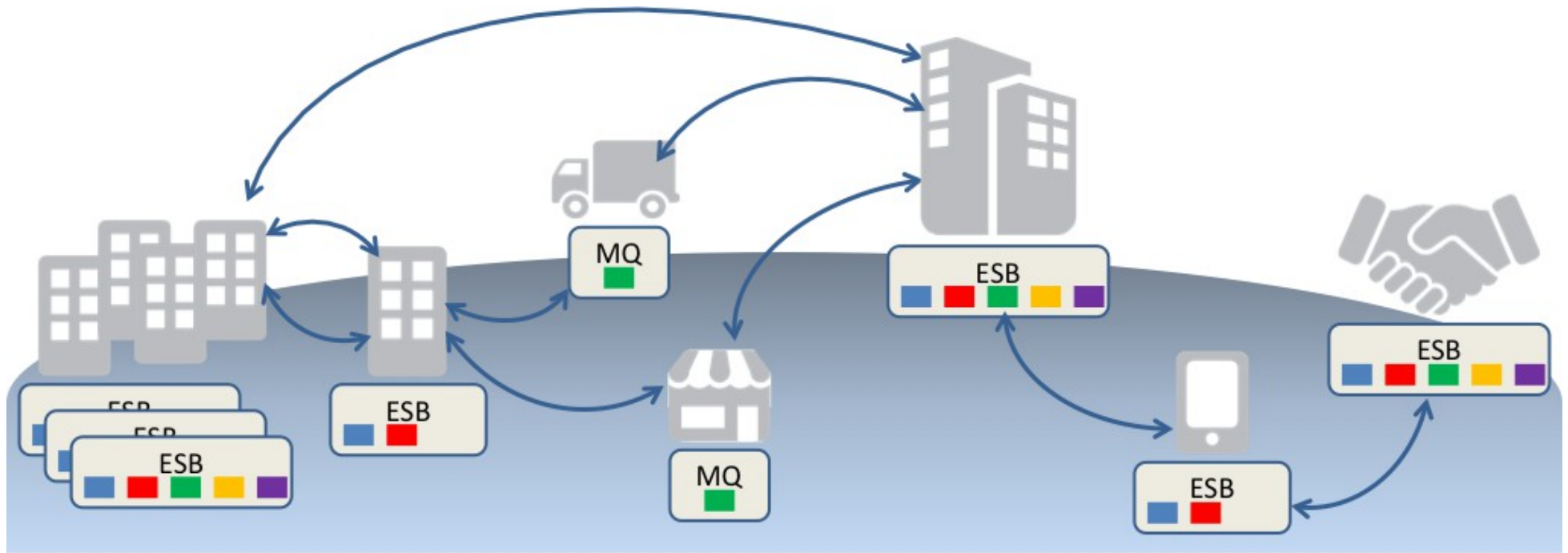
# iPaas

- What is Integration Platform as a Service ?
- Combination of Iaas and Paas



# Integration

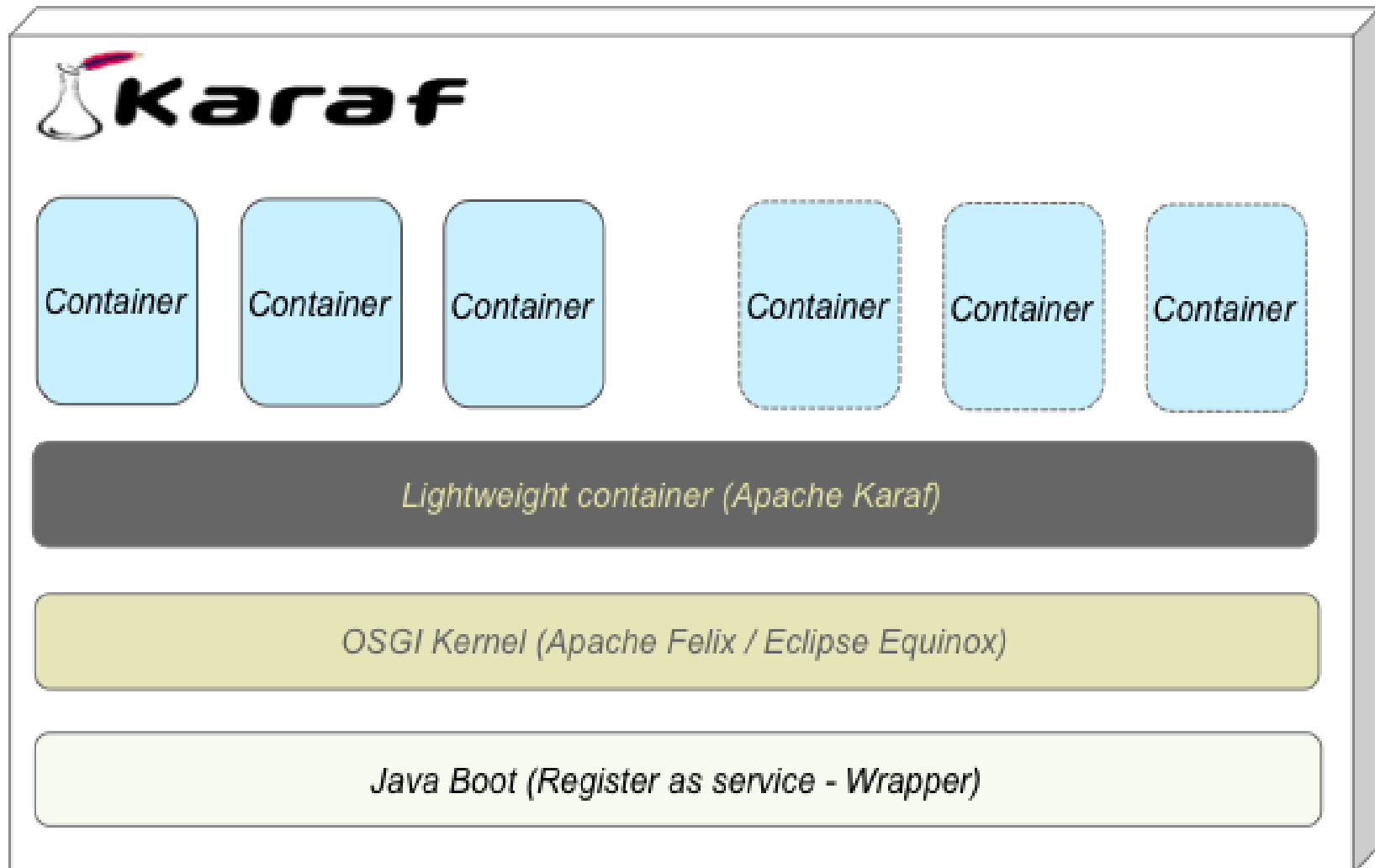
- Integration everywhere = iPaaS



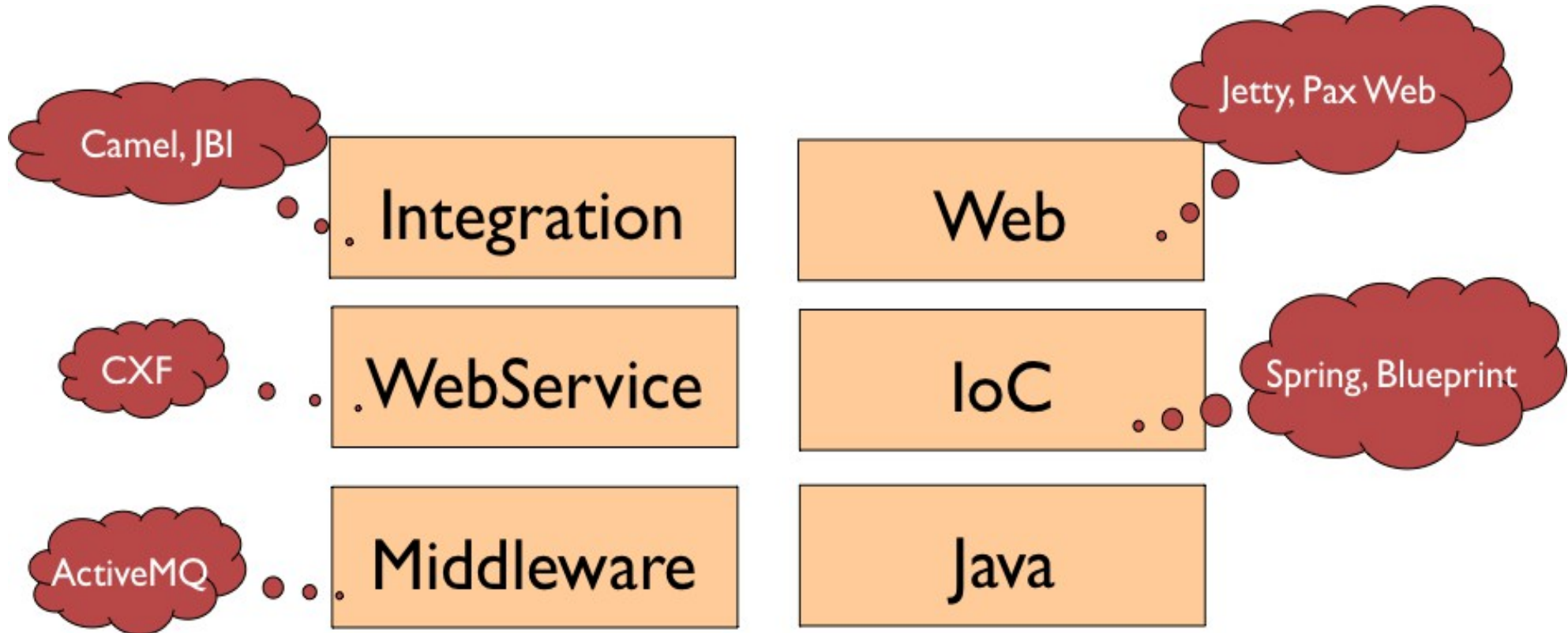
# iPaas - Definition

- Definition : Provide **Fabric** runtimes top of clouding machines for public, private or hybrid clouds
- What is Fabric ?
  - Technology based on Apache **Karaf**
  - Is a Agent working closely with Apache **Zookeeper**

# Apache Karaf



# Apache Karaf





# Fuse Fabric



# Fuse Fabric

- “Integration” projects are really hard to install, configure and run
- Distribution of workload/process is not an easy task
- We want to make it easy!

# Fuse Fabric

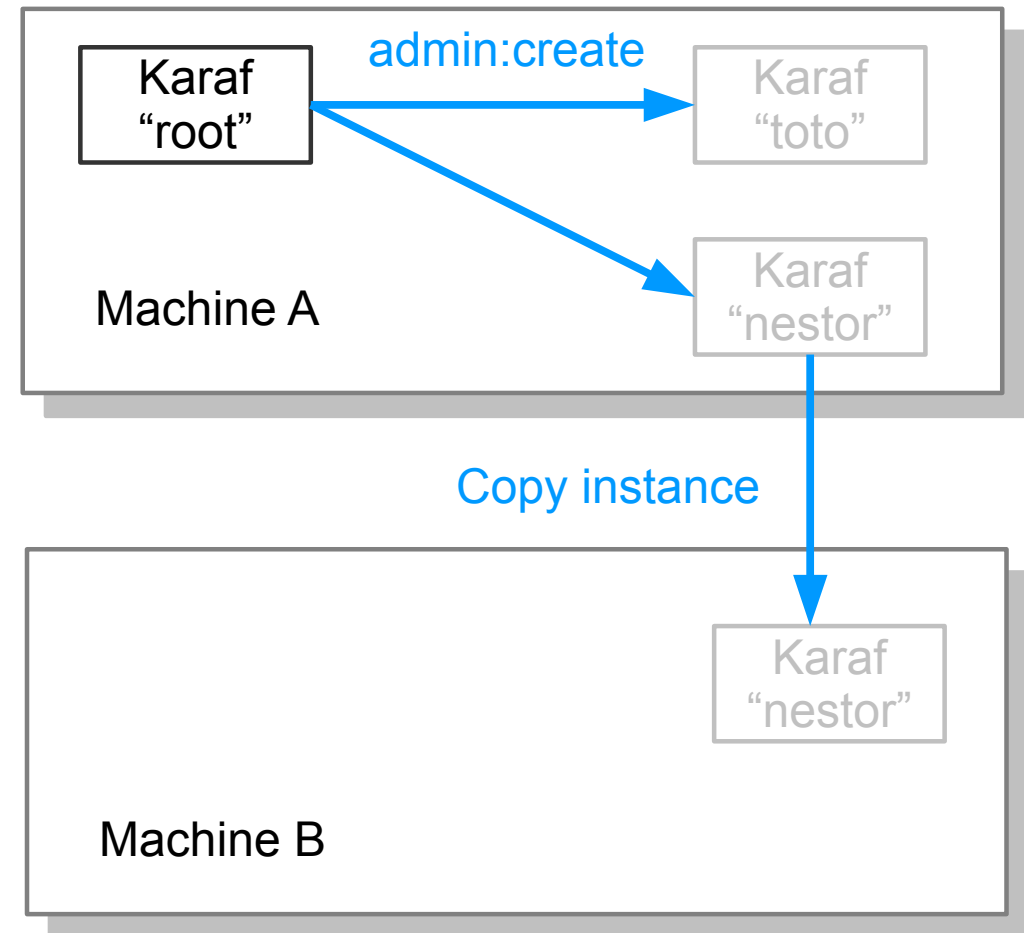
- <http://fabric.fusesource.org/>
- **Open Source Software** for “configuring, provisioning & running Fuse and Apache software on any machines” physical, virtual, private, public, private+public cloud
- Keeps you DRY from those rainy clouds :)
- Weave your containers into an easy to manage Fabric
- Will be donated soon to Apache foundation

# Karaf Admin

- Allows to create instances & administrate them locally or remotely

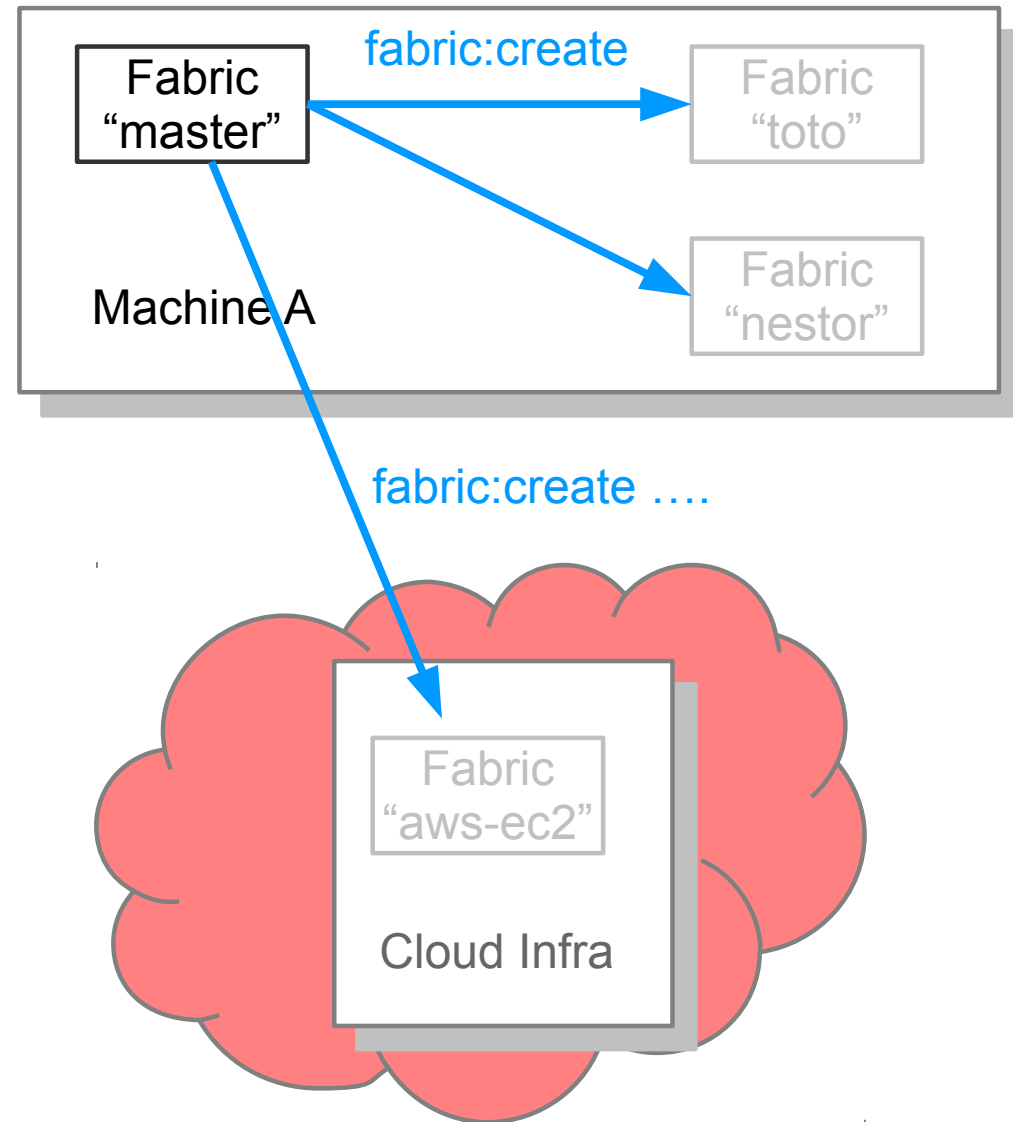
**BUT**

- Instances not “cloned”
- Configurations updated manually
- Process is error prone
- No deployment platform



# Fuse Fabric in the cloud

- Fabric will create instances & manage
  - Locally
  - Remotely (ssh)
  - In the cloud (jclouds)
- Deploy artifacts
- Cloud instance created using jclouds api

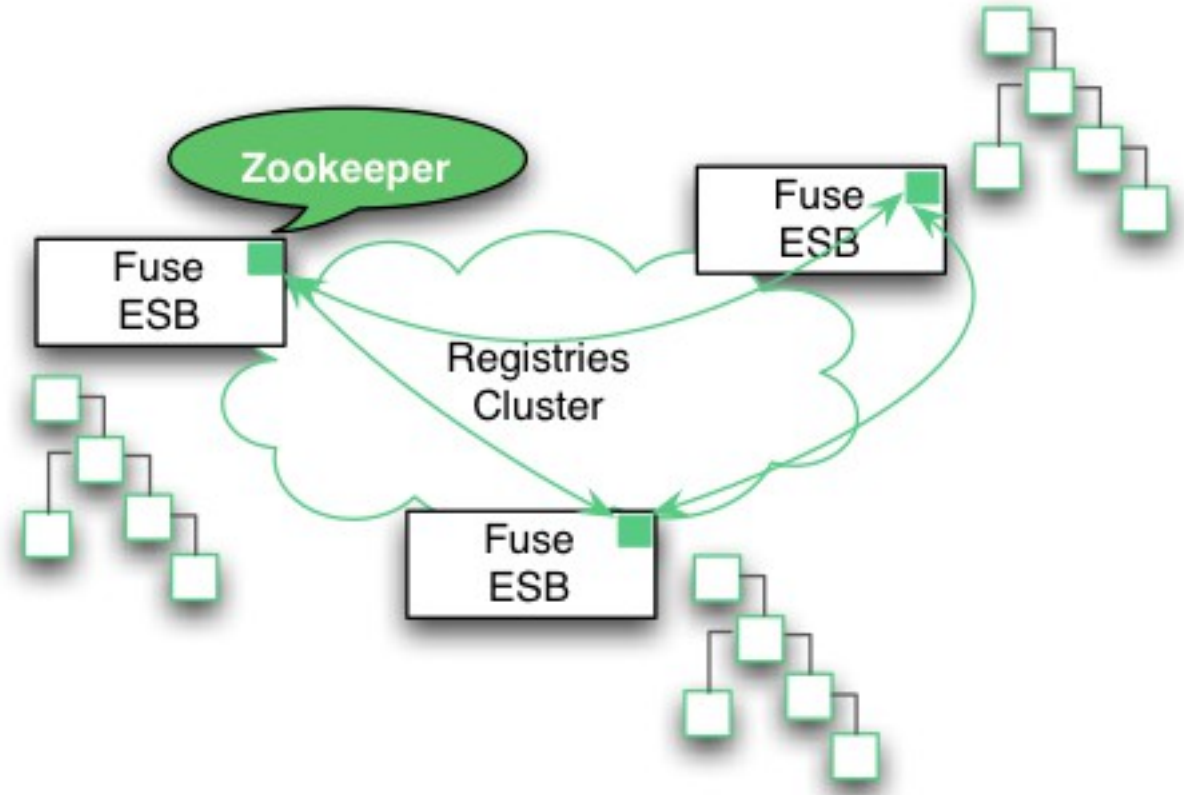


# What is Fabric

- Storage engine = Configurations & registry
- Agents = Spy !
- Profiles = Artifacts to be deployed
- But Also a service factory ;-)
  - Create “indirection” points
  - Load balancing and failover
  - Easy elastic scaling of services

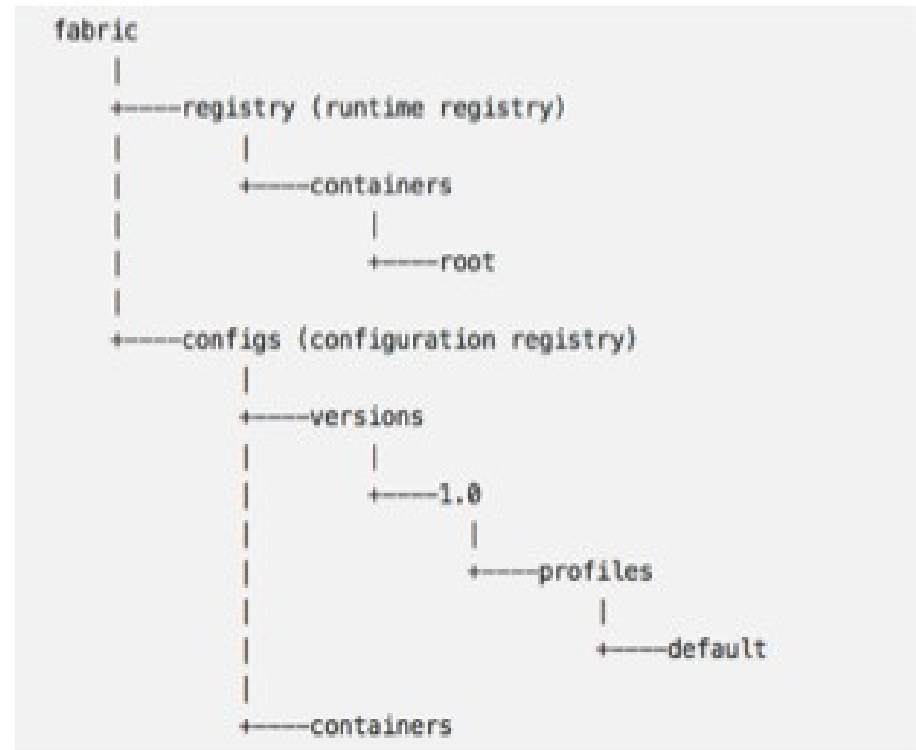
# Storage engine

- Based on Apache ZooKeeper
  - Is a Centralized Coordination Service, distributed and highly reliable
  - Uses a directory & file based structure
  - Part of Fuse “Ensemble”



# Storage engine

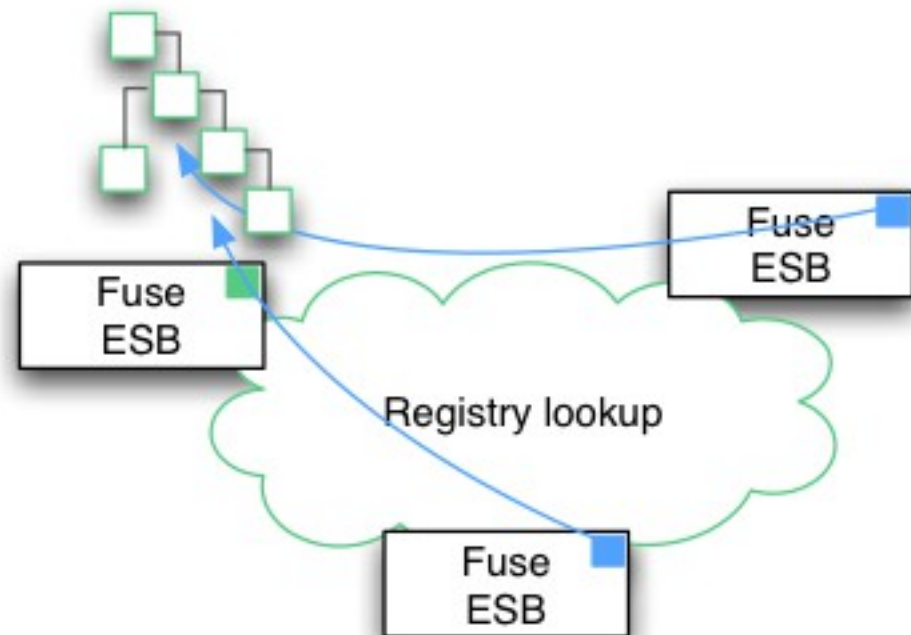
- 2 kinds of “registry” → one for the containers and the other for artifacts
- Artifacts = jars, properties files, system, env properties to be deployed





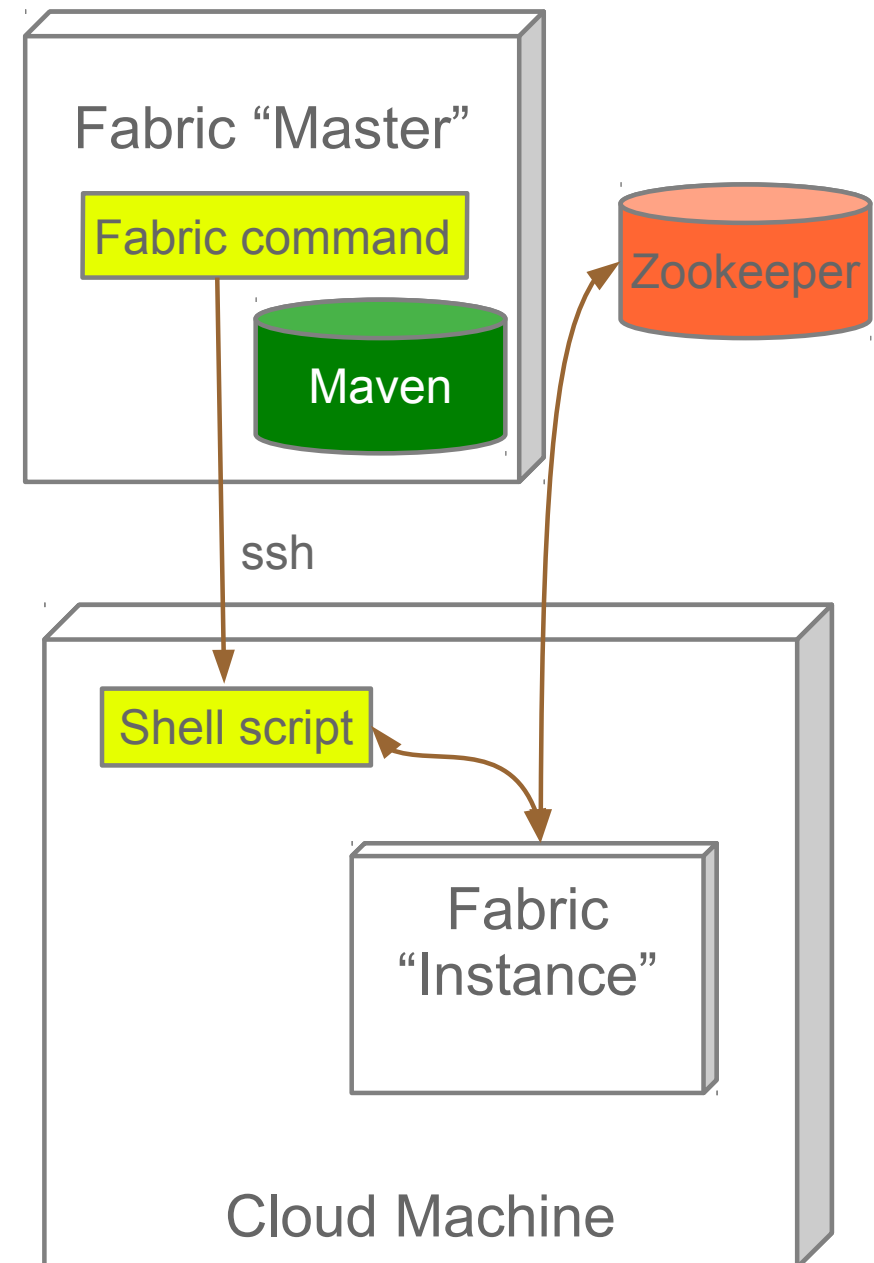
# Agent

- Fabric-agent deployed per Karaf container
- Contains a Zookeeper client
- Agent listens to the registry to configure, provision features & services
- Send info(s) to registry (RMI, SSH)



# Fuse Fabric : What happen

- A Karaf fabric container is created
- Fabric agent is registered with Zookeeper
- “Artifacts” to be deployed are loaded from Profile(s)
- Maven proxy is used



# Fuse Fabric - Installation

- Deploy features (= artifacts required)

```
FuseFabric:karaf@root> features:install jclouds-api-cloudstack  
FuseFabric:karaf@root> features:install jclouds-commands  
FuseFabric:karaf@root> features:install fabric-jclouds
```

- Will install commands, libraries required to communicate with Cloud Providers and manage instances

# Fuse Fabric - Setup

- A. Create “ensemble” (optional)

```
FuseFabric:karaf@root> fabric:create
```

- B. Add a provider

```
FuseFabric:karaf@root> fabric:cloud-provider-add --api cloudstack --endpoint http://localhost:8080/client/api --identity  
0a7207NeLtnfnzJGg_tZScgM7S0Ln3x0AVv5T3VxeC0k3kljvcngfGGxp9lM7lvNSsPjcw1BUZpc4Puliv91mQ --credential VxX99WoyuZIdiG2MwnUjT  
qL6EQWfbaXFrgsdD8KIDpedsX0L_sb1rp0tirYMCrbIf0KBZLw1BE0lSf9rhJJD4w --name my-cloudstack  
Waiting for cloudstack service to initialize.
```

A = Api of the jclouds provider

B = Public key

C = Password

# jclouds

## “A Cloud Tooling framework”

# jclouds

- Umbrella project
- jclouds : open source library that helps you get started in the cloud.
- API gives you the freedom to use portable abstractions or cloud-specific features.

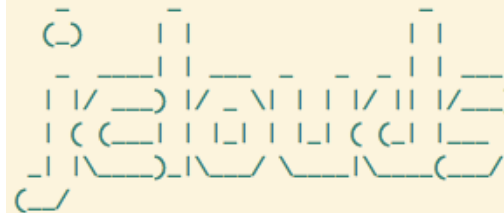


jclouds  
multi - cloud library

# jclouds

- BlobStore api  
= simplify storage management (S3, ...)
- Compute Api  
= manage nodes
- Node api
- Tools = Karaf client

```
RedHat-MacBook:bin chmoulli$ ./jclouds-cli
```



```
jclouds cli (1.5.2)  
http://jclouds.org
```

```
Hit '<tab>' for a list of available commands  
and '[cmd] --help' for help on a specific command.  
Hit '<ctrl-d>' to shutdown jclouds cli.
```

```
jclouds> jclouds.  
jclouds:blobstore-create          jclouds:blobstore-delete  
jclouds:blobstore-list           jclouds:blobstore-read  
jclouds:blobstore-service-create jclouds:blobstore-service-destroy  
jclouds:blobstore-service-list   jclouds:blobstore-write  
jclouds:compute-service-create   jclouds:compute-service-destroy  
jclouds:compute-service-list     jclouds:group-destroy  
jclouds:group-runscrip           jclouds:hardware-list  
jclouds:image-create             jclouds:image-list  
jclouds:location-list            jclouds:node-create  
jclouds:node-destroy             jclouds:node-destroy-all  
jclouds:node-info                jclouds:node-list  
jclouds:node-resume              jclouds:node-runscrip  
jclouds:node-suspend             jclouds:provider-info  
jclouds> jclouds:
```

# jclouds

- 30 cloud providers & cloud software stacks including Amazon, GoGrid, Ninefold, vCloud, OpenStack, and Azure.



GOGRID



EUCALYPTUS



# Who uses jclouds

- RedHat - OpenShift to deploy applications to Terremark, RackSpace & EC2
- Twitter, Adobe
- GigaSpace, SalesForces
- General Electric
- Camel, Karaf, Cellar, Fabric



**jclouds**  
multi - cloud library

# Apache CloudStack

“Allow to manager virtual machines”



# CloudStack

## cloudstack

- Apache project
- Citrix work (> April 2011)
- Software designed to deploy and manage large networks of virtual machines, as a highly available, highly scalable Infrastructure as a Service (IaaS) cloud computing platform.
- Supports the most popular hypervisors: VMware, Oracle VM, KVM, XenServer and Xen Cloud Platform

# CloudStack – Infrastructure

## Private Clouds

### On-premise Enterprise Cloud



- Dedicated resources
- Security & total control
- Internal network
- Managed by Enterprise or 3<sup>rd</sup> party

## Public Clouds

### Hosted Enterprise Cloud



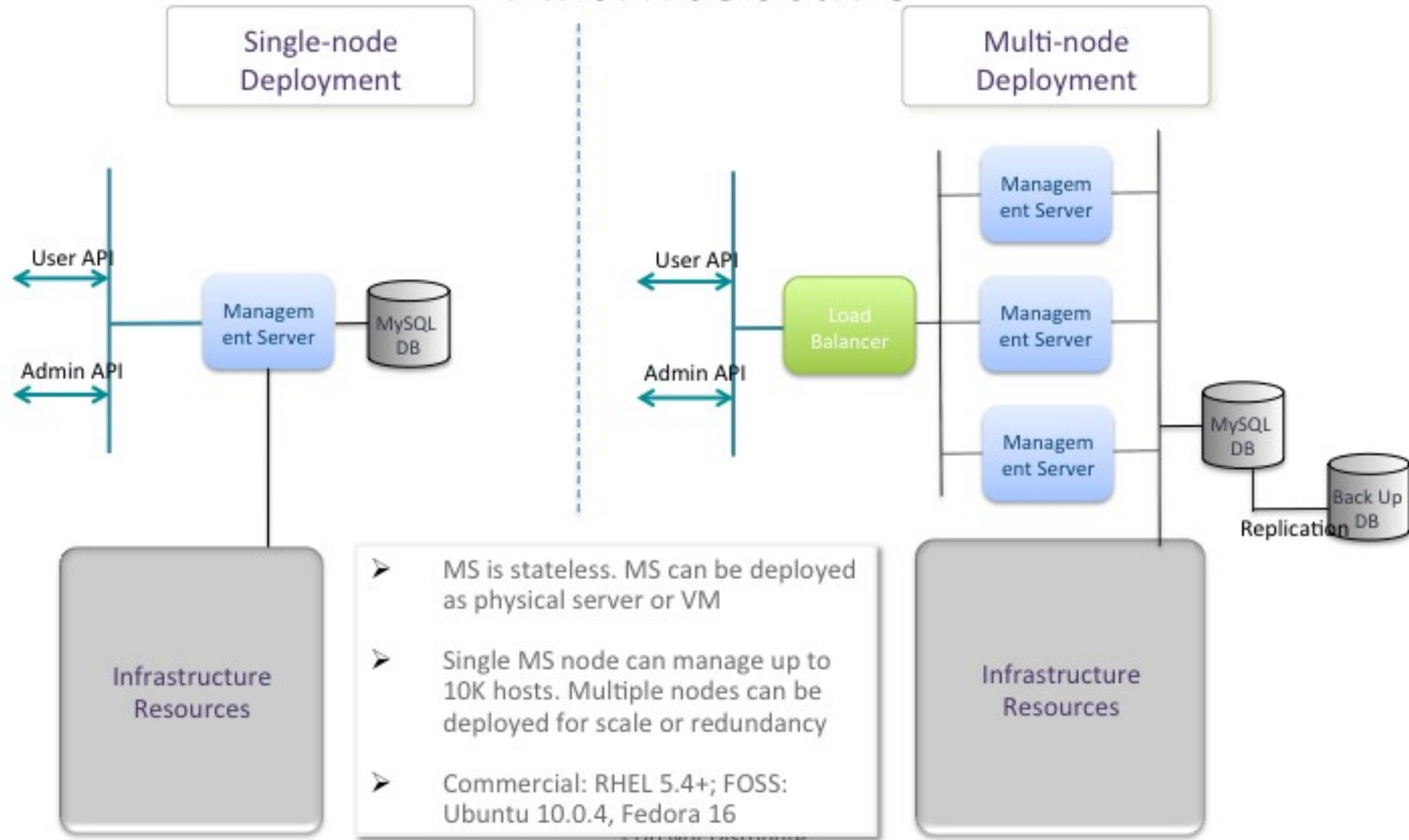
- Dedicated resources
- Security
- SLA bound
- 3<sup>rd</sup> party owned and operated

### Multi-tenant Public Cloud

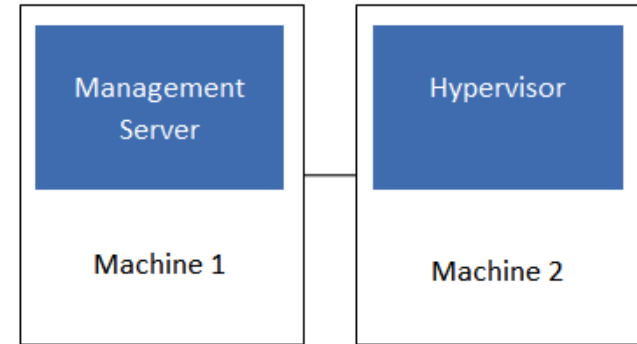


- Mix of shared and dedicated resources
- Elastic scaling
- Pay as you go
- Public internet, VPN access

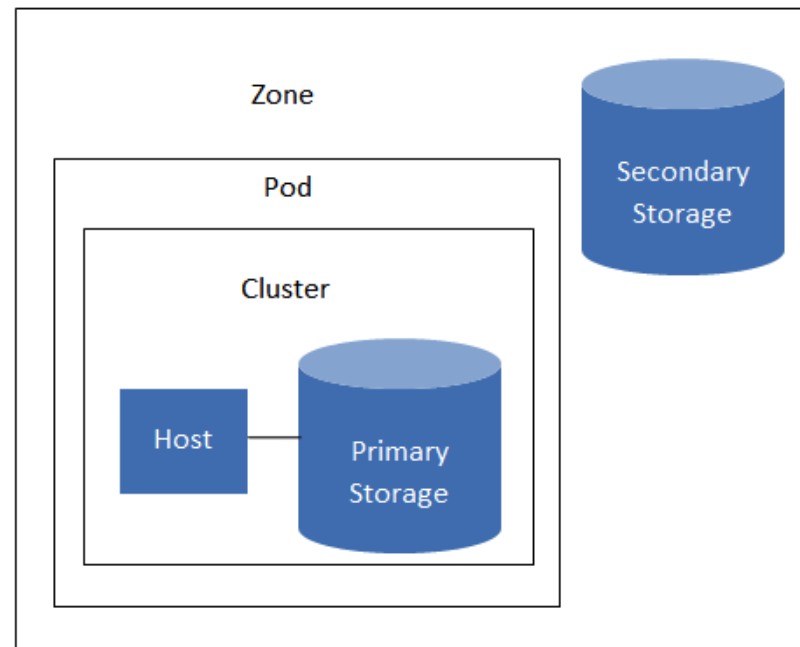
# Management Server Deployment Architecture



# CloudStack



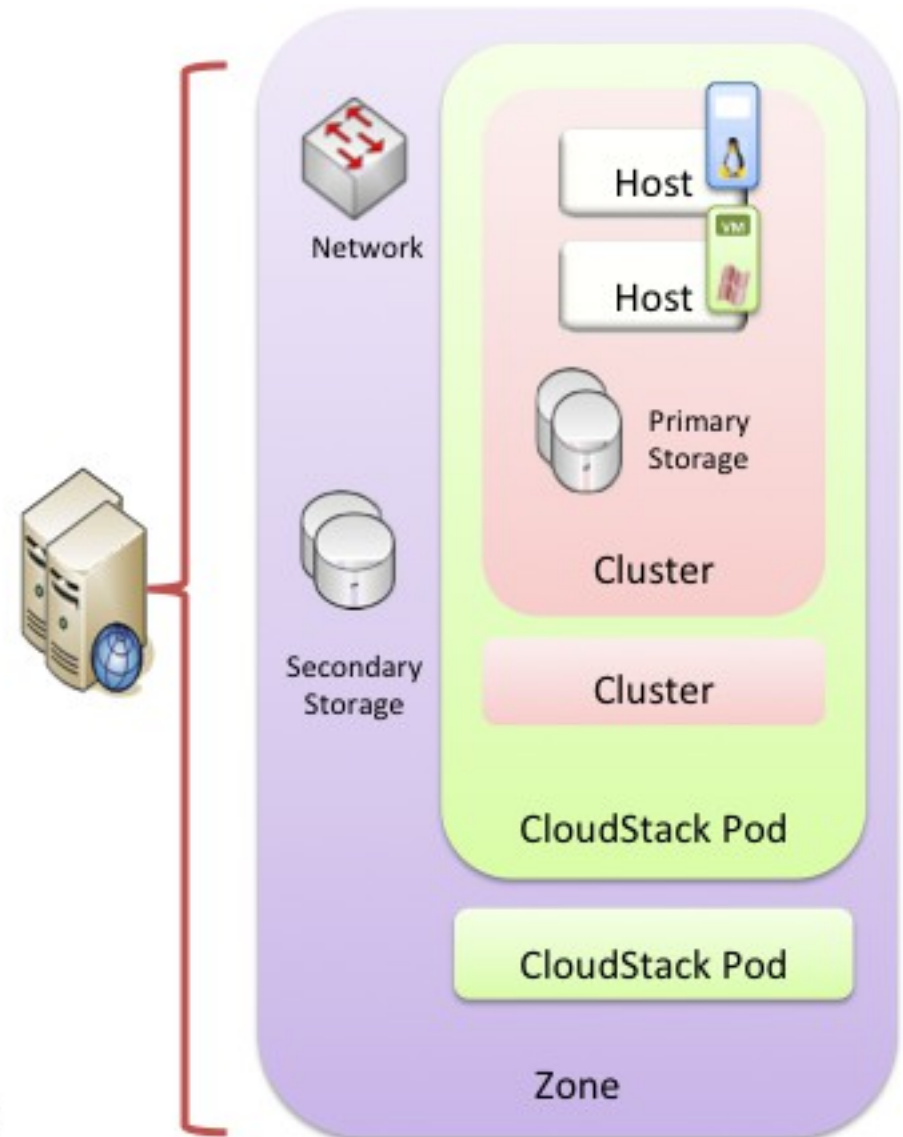
Simplified view of a basic deployment



Nested organization of a zone

# CloudStack – Core Components

- **Hosts**
  - Servers onto which services will be provisioned
- **Primary Storage**
  - VM storage
- **Cluster**
  - A grouping of hosts and their associated storage
- **Pod**
  - Collection of clusters
- **Network**
  - Logical network associated with service offerings
- **Secondary Storage**
  - Template, snapshot and ISO storage
- **Zone**
  - Collection of pods, network offerings and secondary storage
- **Management Server Farm**
  - Responsible for all management and provisioning tasks



# CloudStack – Self Service Portal





# CloudStack

The screenshot displays the CloudStack dashboard interface. At the top, there's a navigation bar with 'CloudStack' on the left, '0 Notifications' in the center, and 'Default View' and 'Project View' buttons on the right. A dropdown menu shows 'admin cloud'. A left sidebar contains navigation links: Dashboard, Instances, Storage, Network, Templates, Events (with a calendar icon for the 15th), Projects, Accounts, Domains, Infrastructure, Global Settings, and Service Offerings.

The main content area is divided into several sections:

- General Alerts:** Contains three alert items, each with a red 'X' icon:
  - Usage Server:** No usage server process running. 26 Oct 2012 13:01:13.
  - Management Server:** Management network CIDR is not configured original... 26 Oct 2012 12:01:13.
  - Management Server:** Management server node 127.0.0.1 is up. 26 Oct 2012 12:01:11.
- Host Alerts:** Contains one alert item with a red 'X' icon:
  - nfs://192.168.56.2:/opt/storage/secondary:** Alert state detected.
- System Capacity:** A table showing resource usage across different zones and pods. It includes a 'Fetch latest' button.

Zone	Pod	Cluster	Resource	Usage	Capacity
Zone: DevCloud0	Pod: test00	Cluster: test000	Local Storage	56%	7.91 GB / 13.90 GB
Zone: DevCloud0	Pod: test00	Cluster: test000	Local Storage	56%	7.91 GB / 13.90 GB
Zone: DevCloud0	Pod: test00	Cluster: test000	Memory	17%	400.00 MB / 2.28 GB
Zone: DevCloud0	Pod: test00	Cluster: test000	Memory	17%	400.00 MB / 2.28 GB
Zone: DevCloud0	Pod: test00	Cluster: test000	Secondary Storage	40%	5.58 GB / 13.90 GB
Zone: DevCloud0	Pod: test00	Cluster: test000	Memory	17%	400.00 MB / 2.28 GB
Zone: DevCloud0	Pod: test00	Cluster: test000	Management IP Addresses	14%	3 / 21

# Fuse Fabric : Cloud providers

Amazon EC2

Cloustack

```
FuseFabric:karaf@root> features:install jclouds
jclouds
jclouds-api-ec2
jclouds-api-filesystem
jclouds-api-rackspace-cloudidentity
jclouds-api-vcloud
jclouds-aws-s3
jclouds-cloudfiles-uk
jclouds-cloudfonesstorage
jclouds-cloudsigma-lvs
jclouds-compute
jclouds-driver-log4j
jclouds-elastichosts-lax-p
jclouds-elastichosts-sat-p
jclouds-eucalyptus-s3
jclouds-greenhousedata-element-vcloud
jclouds-guice
jclouds-joyent
jclouds-ninefold-storage
jclouds-rackspace-cloudservers-uk
jclouds-serverlove-z1-man
jclouds-slicehost
jclouds-synaptic-storage
jclouds-trystack-nova
jclouds-api-byon
jclouds-api-elasticstack
jclouds-api-nova
jclouds-api-s3
jclouds-aws-cloudwatch
jclouds-azureblob
jclouds-cloudfiles-us
jclouds-cloudserver-uk
jclouds-cloudsigma-zrh
jclouds-driver-bouncycastle
jclouds-driver-slf4j
jclouds-elastichosts-lon-b
jclouds-elastichosts-tor-p
jclouds-go2cloud-jhb1
jclouds-greenqloud-compute
jclouds-hpcloud-compute
jclouds-joyent-cloudapi
jclouds-nodepool
jclouds-rackspace-cloudservers-us
jclouds-services
jclouds-softlayer
jclouds-trmk-ecloud
jclouds-url-handler
jclouds-api-cloudstack
jclouds-api-eucalyptus
jclouds-api-openstack-nova
jclouds-api-swift
jclouds-aws-ec2
jclouds-bluelock-vcloud-zone01
jclouds-cloudloadbalancers-us
jclouds-cloudserver-us
jclouds-commands
jclouds-driver-jsch
jclouds-driver-sshj
jclouds-elastichosts-lon-p
jclouds-eucalyptus-ec2
jclouds-gogrid
jclouds-greenqloud-storage
jclouds-hpcloud-objectstorage
jclouds-ninefold-compute
jclouds-openhosting-east1
jclouds-rimuhosting
jclouds-skalicloud-sdg-my
jclouds-stratogen-vcloud-mycloud
jclouds-trmk-vcloudexpress
```

Openstack

# Fuse Fabric - Join

- A. Create a container in the cloud

```
FuseFabric:karaf@root> fabric:container-create-cloud --provider cloudstack --image 1b262006-6727-4a39-94c9-66bf50499ff3  
--name my-cloudstack --ensemble-server fuse1
```

- B. Join the container

```
fabric:join 192.168.56.1:2181
```

Jclouds in action

Connect to Zookeeper reg.

- C. Connect

```
fabric:container-connect fuse1
```

ssh session

# Fuse FMC to simplify your life

## FuseSource

## Fuse Management Console

Containers Cloud Profiles Patching Users

Logged in as: admin | Log out ?

### Containers

Create Fuse Container Migrate Containers

Name	Active	Provisioned	Version
FuseManagementConsole	<span style="color: green;">●</span>	<span style="color: green;">●</span>	1.0

Add Profiles Details

#### FuseManagementConsole

Type: Fabric Server

Profiles: [fabric](#) ✕  
[fabric-ensemble-0000-1](#) ✕  
[FuseManagementConsole](#) ✕

Service URLs:

Location:

Local IP: 192.168.1.2

Local Hostname: RedHat-MacBook.local

Public IP:

Public Hostname:

Manual IP:

Resolver: Local Hostname

Provision Status: Success



# Fuse FMC

FuseSource

Fuse Management Console

Containers

Profiles

Users

Logged in as: admin | Log out ?

## Create Fuse Container

Set the container's basic configuration:

Name:

You must specify a container name

Options:

Make container a distributed registry server

JVM Options:

If checked, pass the specified arguments to the new container's JVM

Maven Proxy URL:

If checked, use the specified Maven proxy

Count:

If greater than 1, multiple containers will be created with instance numbers appended to the name

Resolver:

- Local Hostname
- Local IP
- Public Hostname
- Public IP

Cancel

Back

Next

## Create Fuse Container

Select the type of container:

- Child container**  
Create a child Fuse container instance under an existing root container. Child containers can be started and stopped by their parent.
- Remote root container**  
Create a new root container instance via an SSH connection to a remote host.
- Cloud-managed Fuse container**  
Create a new root container on a host obtained from a cloud provider.

## Create Fuse Container

### Cloud Service Configuration

Cloud Provider  Amazon Elastic Compute Cloud (EC2)  
 Rackspace Cloud Servers US  
 Rackspace Cloud Servers UK

Cloud Provider Identity   
You must specify a cloud provider username

Cloud Provider Credential   
You must specify a cloud provider password

Options:  Remember credentials until my session expires

Instance Type

Instance Selection  Specify OS and Version  
 Specify Image ID and Location

# Fuse FMC

**FuseSource** **Fuse Management Console**

Containers Cloud **Profiles** Patching Users Logged in as: admin | Log out ?

## Profiles

Create Version Import Version Export Selected Version

Create Profile Import Profile

### Versions

1.0 ● containers: 1

### Profiles

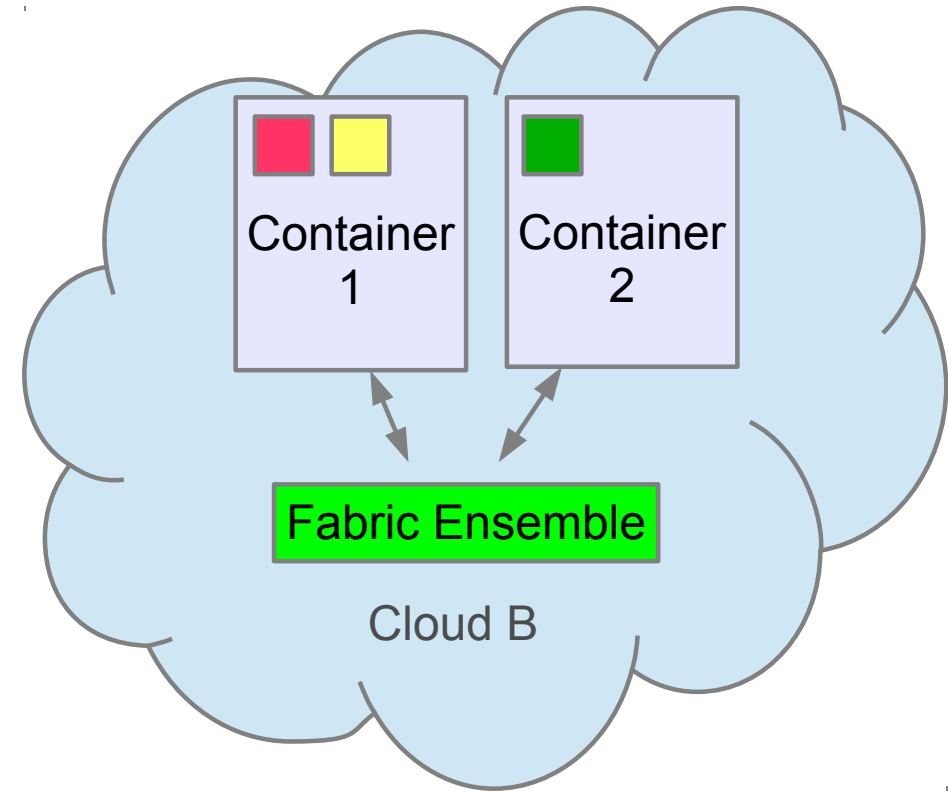
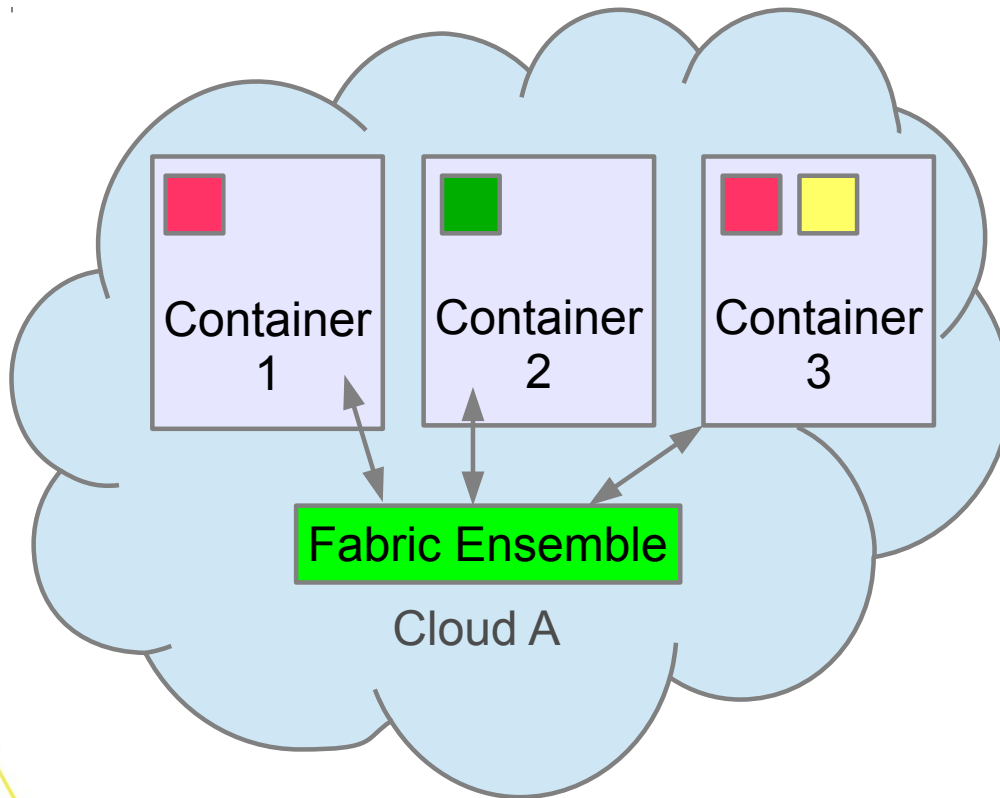
aws-ec2	✕
camel	children: 1
cloud	children: 4
cloudservers-uk	✕
cloudservers-us	✕
cxf	children: 1
default	children: 1
dosgi	✕
esb	✕
example-camel	✕
example-cxf	✕
example-mq	✕



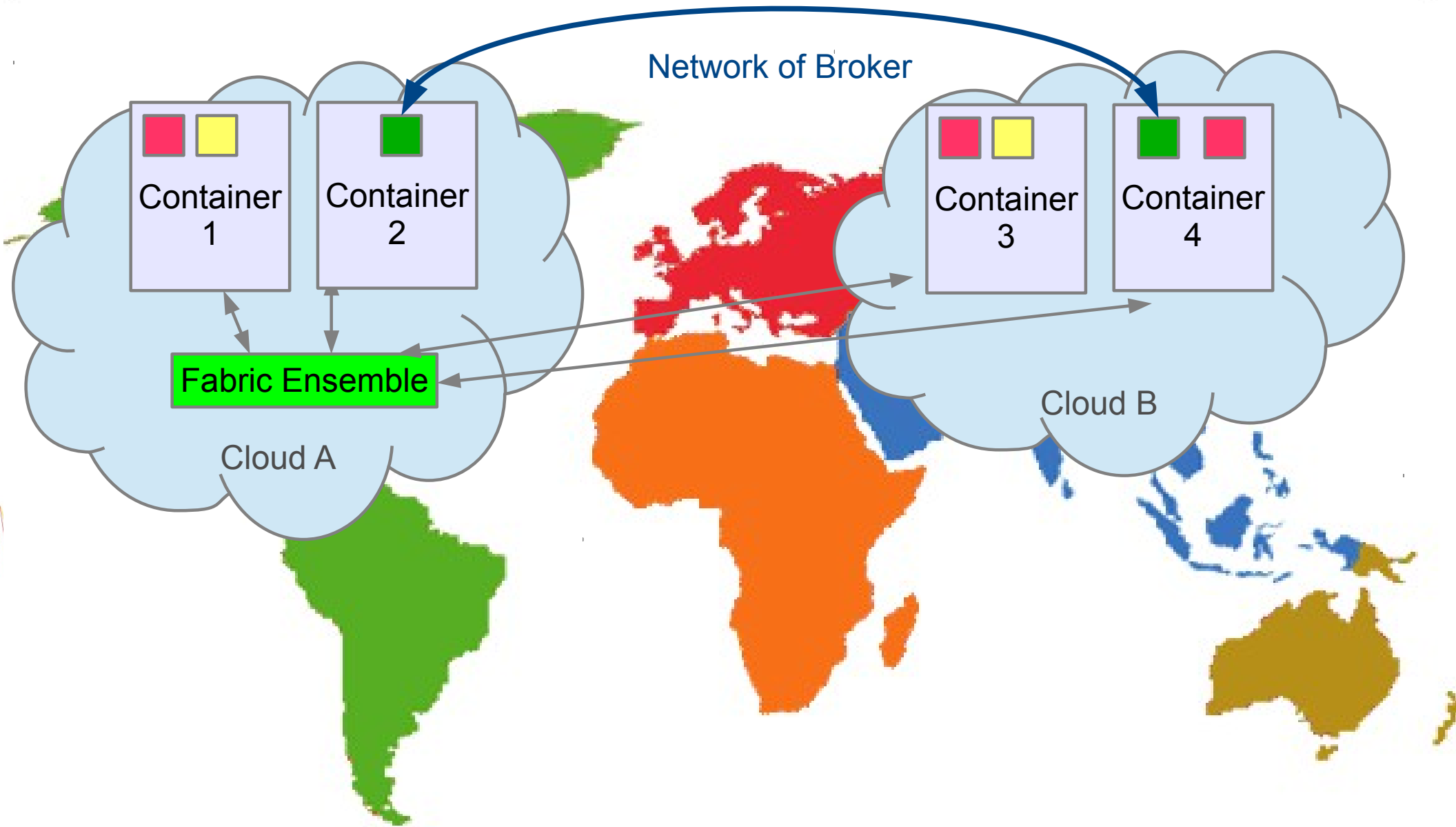
# iPaaS Architectures



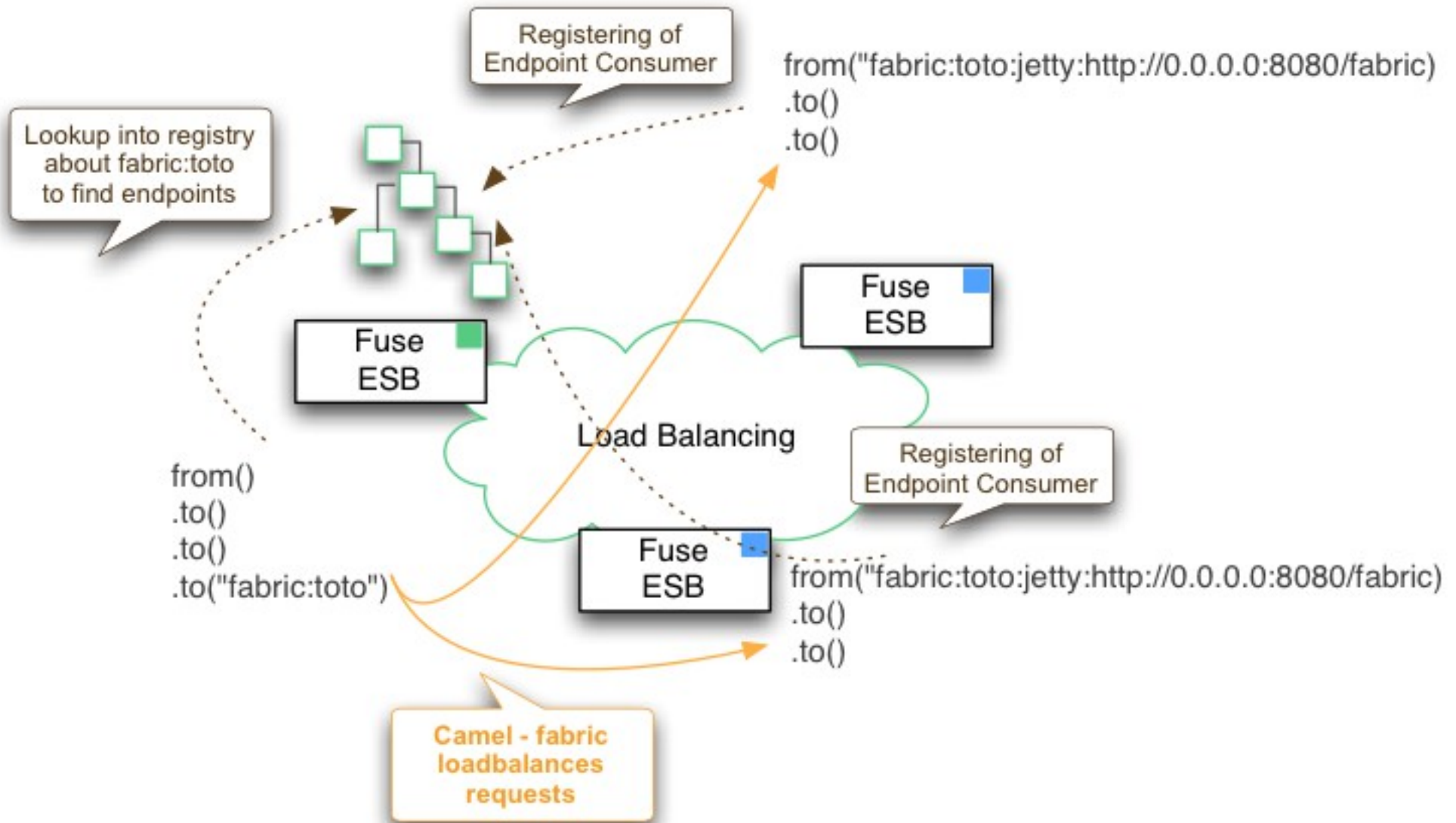
# Architecture - "On an Island"



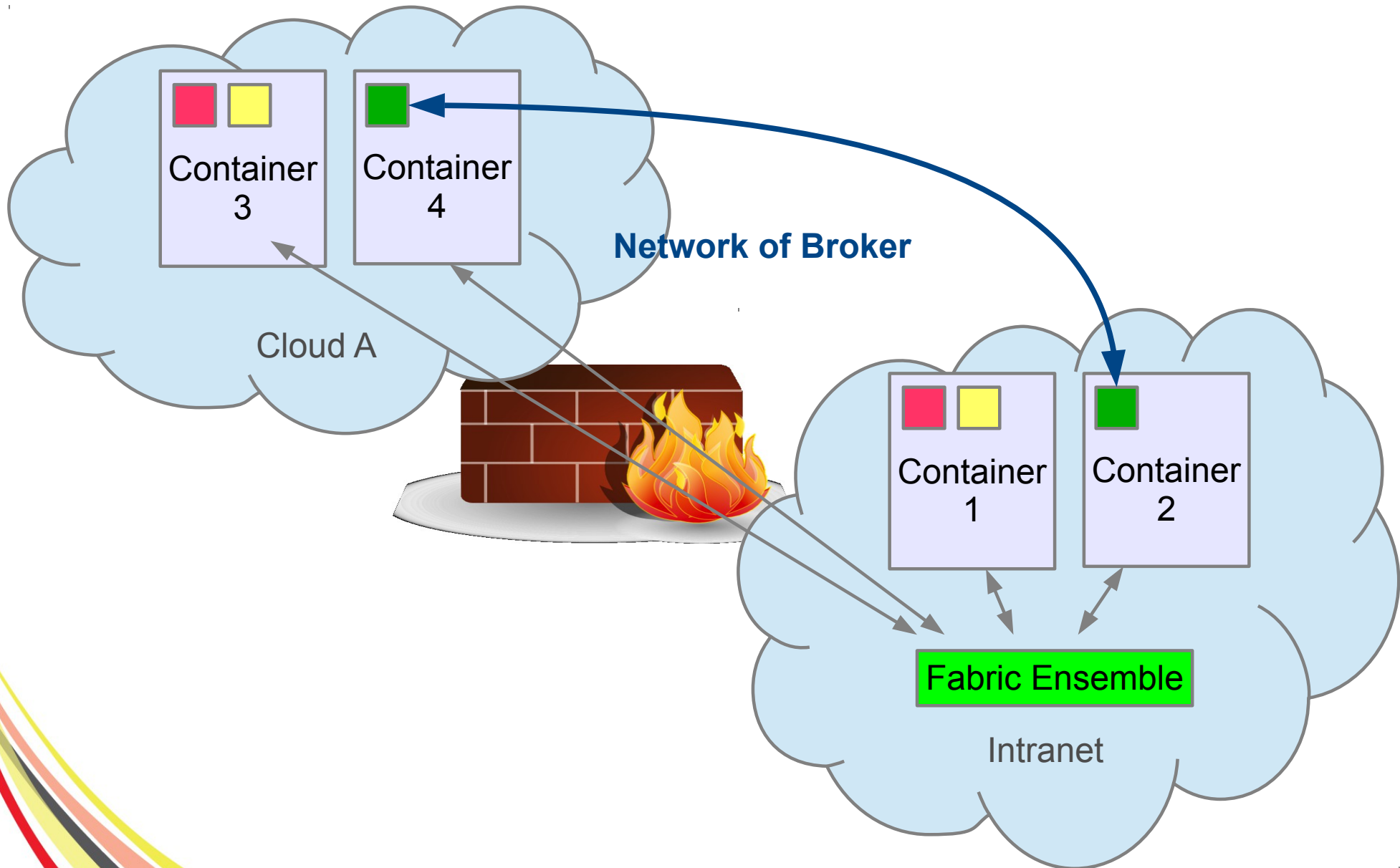
# Architecture - "Interconnected"



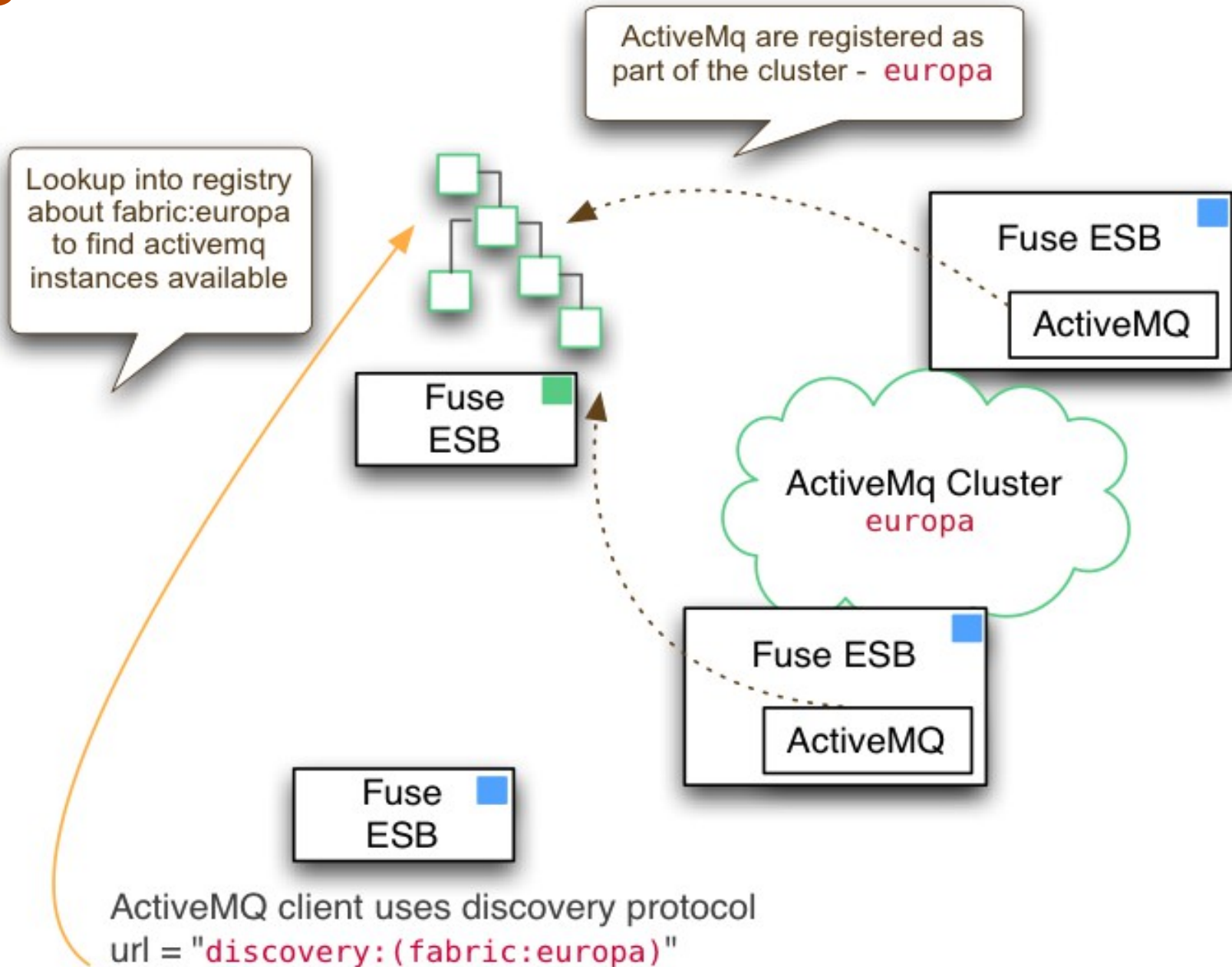
# Using Fabric Camel



# Architecture - "Integrated"



# Using Fabric ActiveMQ



# Demo & Conclusion



# Conclusion

- Fuse Fabric technology is ready and mature to allow to deploy iPaaS projects
  - Use best of Java api (jclouds) and support many Cloud providers
  - Support Public, Private and Hybrid infrastructure
  - Designed to deploy Camel, CXF, ActiveMQ in the cloud
- 



# Questions



 @cmoulliard

cmoulliard@apache.org

Fuse Fabric : <http://fabric.fusesource.com>