Deploying FuseMQ in enterprise using Fuse Fabric

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FuseSource

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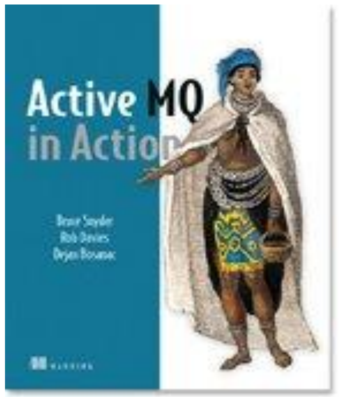

Agenda

- Problems of large enterprise deployments
- Fuse Fabric in nutshell
- FuseMQ and Fuse Fabric
  - Creating brokers
  - Connecting
  - Topologies
- Fuse Management Console

Problems of large deployments

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Problems – Deploying and maintenance

- Main problems
  - Installing brokers on multiple hosts
    - ssh, untar, set directories and environment
  - Setting configuration manually for every broker
    - copying xml config, tweaking, testing
  - Updating configuration across cluster
  - Upgrading brokers

<u>It’s very tedious and error-prone process</u>

Problems – Traditional best-practice tips

- Keep XML as a template and configure node-specific details through properties
- Keep configuration in SVC system (git, svn, ...)
- Keep configuration separate from installation for easier upgrades

<u>Deployment with Fuse Fabric moves it to the next level</u>

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Problems - Clients

- Topology is very “static”
- Clients need to be aware of topology
- Clients need to know broker locations
- Changes are not easy as clients need to be updated
- Adding new resources (brokers) requires client updates
- Not suitable for “cloud” deployments

Fuse Fabric makes deployments more “elastic”

Fuse Fabric in a nutshell

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Fuse Fabric in a nutshell

- How Fabric can help?

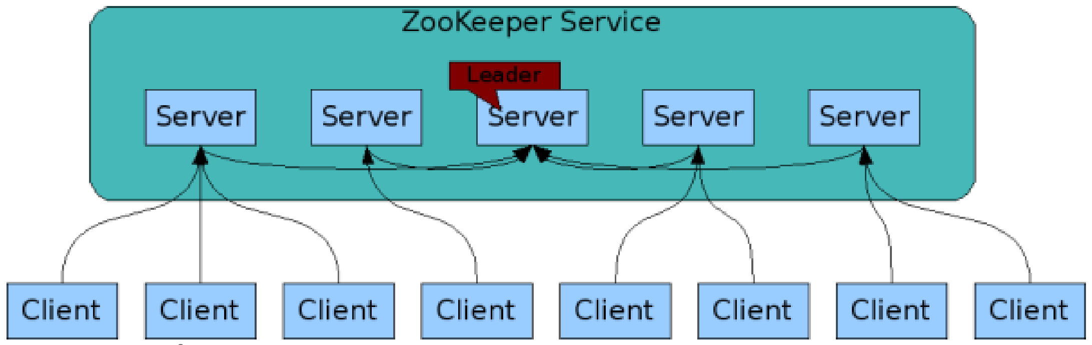
  - It provides centralized distributed broker configuration
  - It provides centralized distributed broker registry
  - Uses OSGi and Apache Karaf for easy spawning new broker instances
  - It provides additional tools for centralized configuration and monitoring (Fuse Management Console)

Fuse Fabric in a nutshell

- Installation
  - Features and bundle versions centrally stored and managed
  - Easy installation and upgrade
- Configuration
  - Stored in one place
  - Versioned
- Discovery
  - All brokers registered in central registry
  - Allows clients to connect without knowing broker locations
  - Allows easy creation of advanced topologies

Fuse Fabric Architecture

- Zookeeper



  - Replicated in-memory tree
  - Similar to file system
  - Highly-available
  - Distributed
  - Support network split
  - Proven track record

Ideal for distributed configuration and locking

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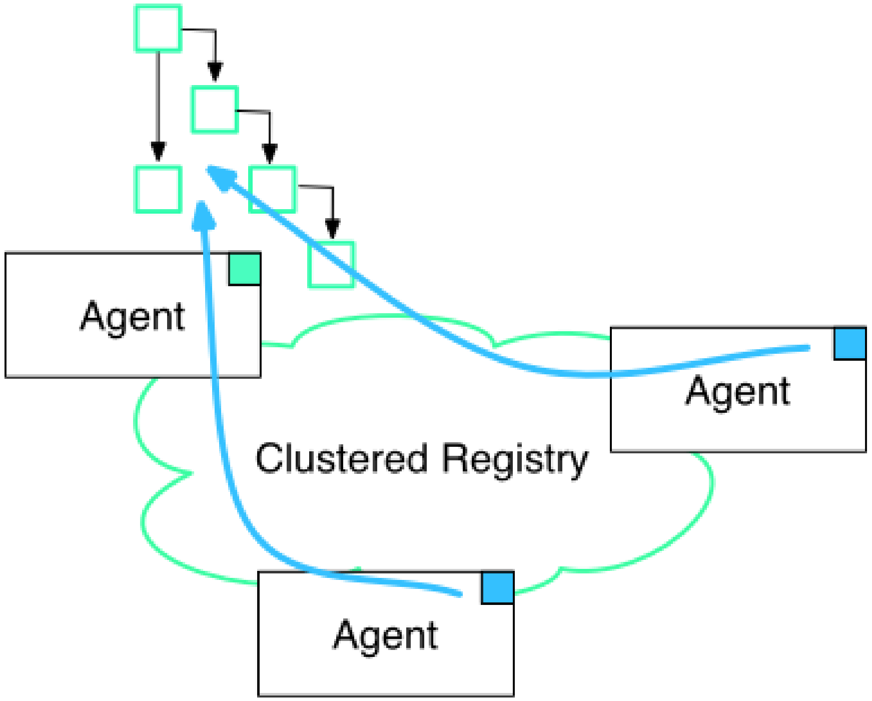
Fuse Fabric Architecture

- Containers
  - Apache Karaf instances provisioned through central registry (Zookeeper)



Fuse Fabric Architecture

- Profiles:
  - Zookeeper nodes with conventional names
  - OSGi configuration for the node (so we know what features and bundles should be used)
  - Other configuration (**centralized broker configuration**)
  - Versioned

Fuse Fabric - Profile

```
FuseFabric:karaf@root> profile-display default
Profile id: default
Version   : 1.0
Parents   :
Associated Containers :

Container settings
----------------------------
Repositories :
        mvn:org.fusesource.fabric/fuse-fabric/7.0-SNAPSHOT/xml/features

Features :
        fabric-agent
        karaf
        fabric-jaas
        fabric-core
```

Fuse Fabric - Profile

Agent Properties :

```
  org.ops4j.pax.url.mvn.repositories =
http://repo1.maven.org/maven2,
http://repo.fusesource.com/nexus/content/repositories/releases,
http://repo.fusesource.com/nexus/content/groups/ea,
http://repository.springsource.com/maven/bundles/release,
http://repository.springsource.com/maven/bundles/external,
http://scala-tools.org/repo-releases
  org.ops4j.pax.url.mvn.defaultRepositories =
file:${karaf.home}/${karaf.default.repository}@snapshots,
file:${karaf.home}/local-repo@snapshots
```

```
Configuration details
----------------------------
PID: org.fusesource.fabric.zookeeper
  zookeeper.url ${zk:root/ip}:2181
```

FuseMQ and Fuse Fabric

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FuseMQ features

- mq-base profile
  - Defines OSGi features and bundles to be installed
  - Defines basic broker settings
- mq-create command
  - Helper command for creating brokers
  - Creates an new profile based on mq-base
  - Optionally creates new containers
  - Assigns the profile to containers (essentially starts the broker)

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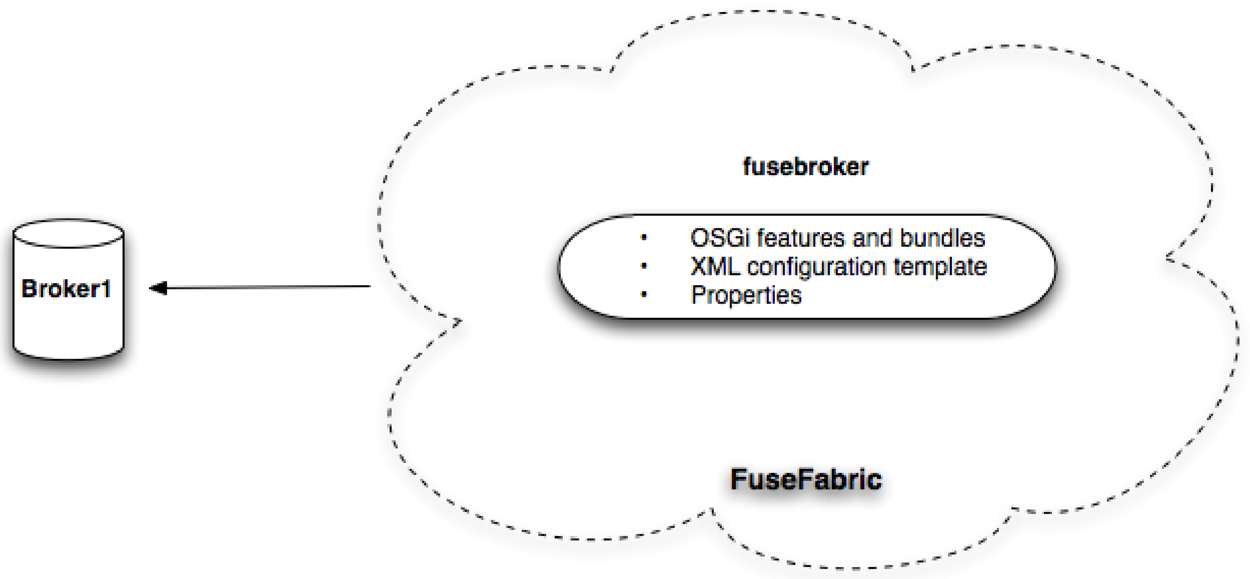
MQ – Creating broker

```
FuseFabric:karaf@root> mq-create --create-container broker1 fusebroker
MQ profile fusebroker ready
Successfully created container broker1
```



MQ Profile

```
FuseFabric:karaf@root> profile-display fusebroker
Profile id: fusebroker
Version   : 1.0
Parents   : mq-base
Associated Containers : broker1

Configuration details
----------------------------
PID: org.fusesource.mq.fabric.server-fusebroker
  standby.pool default
  connectors openwire
  broker-name fusebroker
  data data/fusebroker
  config zk:/fabric/configs/versions/1.0/profiles/mq-base/broker.xml
  group default
```

MQ – Assigning profile

```
FuseFabric:karaf@root> container-create-ssh --host 192.168.1.106
--user dejanb --password xxx broker1
```

```
FuseFabric:karaf@root> mq-create --assign-container broker1 fusebroker
MQ profile fusebroker ready
Profile successfully assigned to broker1
```

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MQ - Benefits

- What did we achieve with this?
  - We can easily create new brokers with the same profiles
  - We can create new profile version with updated broker version and/or changed configuration
  - We can easily update all (or some) brokers by applying the new profile

MQ Profile - Management

- Create a new profile version
  - with upgraded bundles
  - and configuration changes
- Try it out on a non-production container
- Deploy to one or a few production containers
- Roll the full upgrade
- Easy rollback if anything goes wrong

Broker Registry

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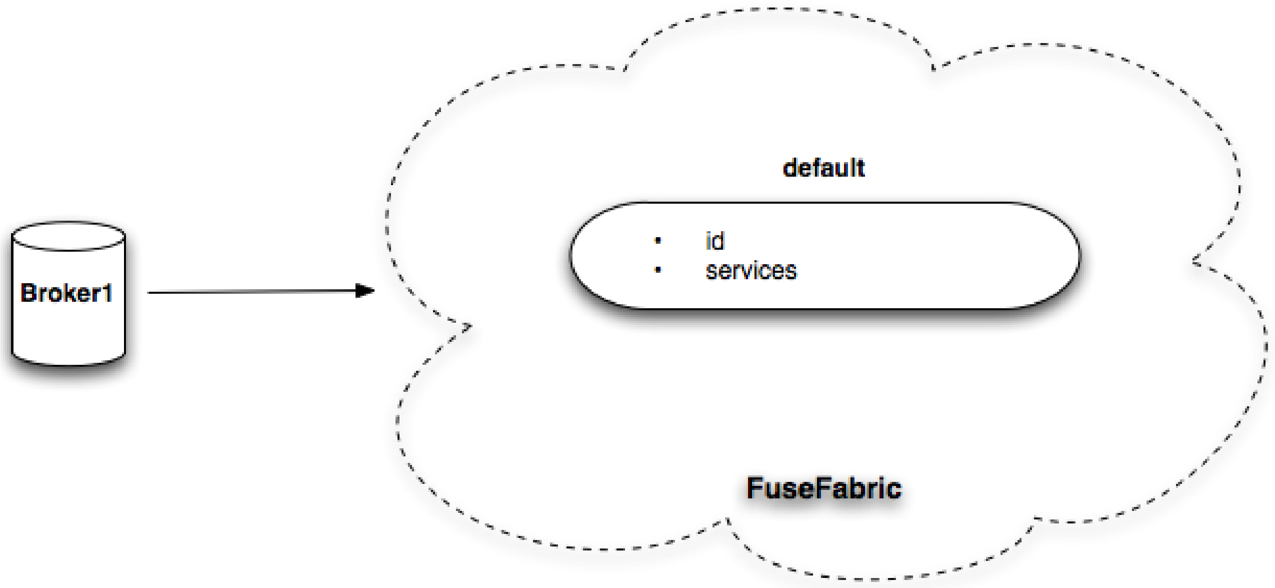
Broker Registry

- Brokers are organized in groups (clusters)
  - Cluster can have any number of brokers (with different names)
  - Put in "default" group if not specified

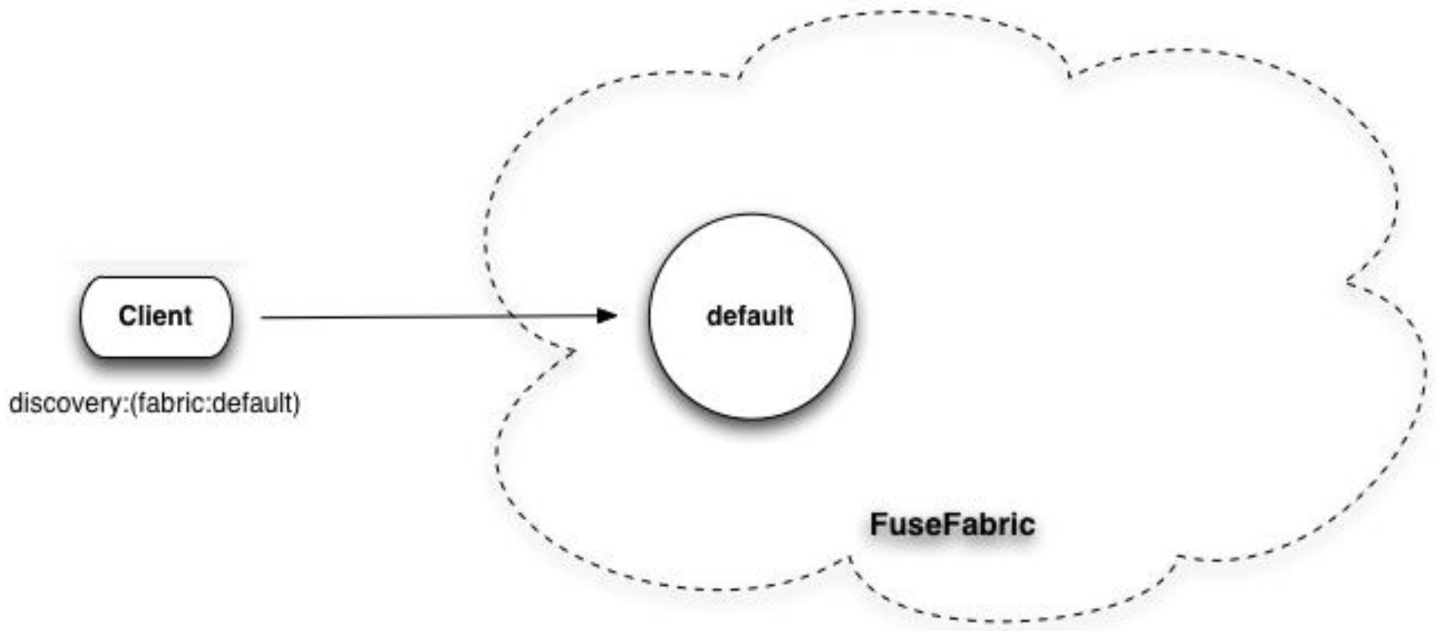


Connecting to the Broker

- Clients need to have ZooKeeper URL
- There is a new discovery protocol (called fabric)
- Connecting is as easy as defining the group

Connecting - Factory

```
ActiveMQConnectionFactory factory =
          new ActiveMQConnectionFactory("discovery:(fabric:default)");
```



Connecting - Reconnecting

- Clients don’t need to know brokers location
- Works like a failover transport
- Supports options for tuning reconnecting options

```
discovery:(fabric:default)?reconnectDelay=1000&useExponentialBackOff=false
```

Connecting - Camel

```
<camelContext xmlns="http://camel.apache.org/schema/spring">
                <!– Do your magic here -->
</camelContext>

<bean id="activemq"
   class="org.apache.activemq.camel.component.ActiveMQComponent">
   <property name="brokerURL" value=”discovery:(fabric:discovery)"/>
</bean>
```

Topologies

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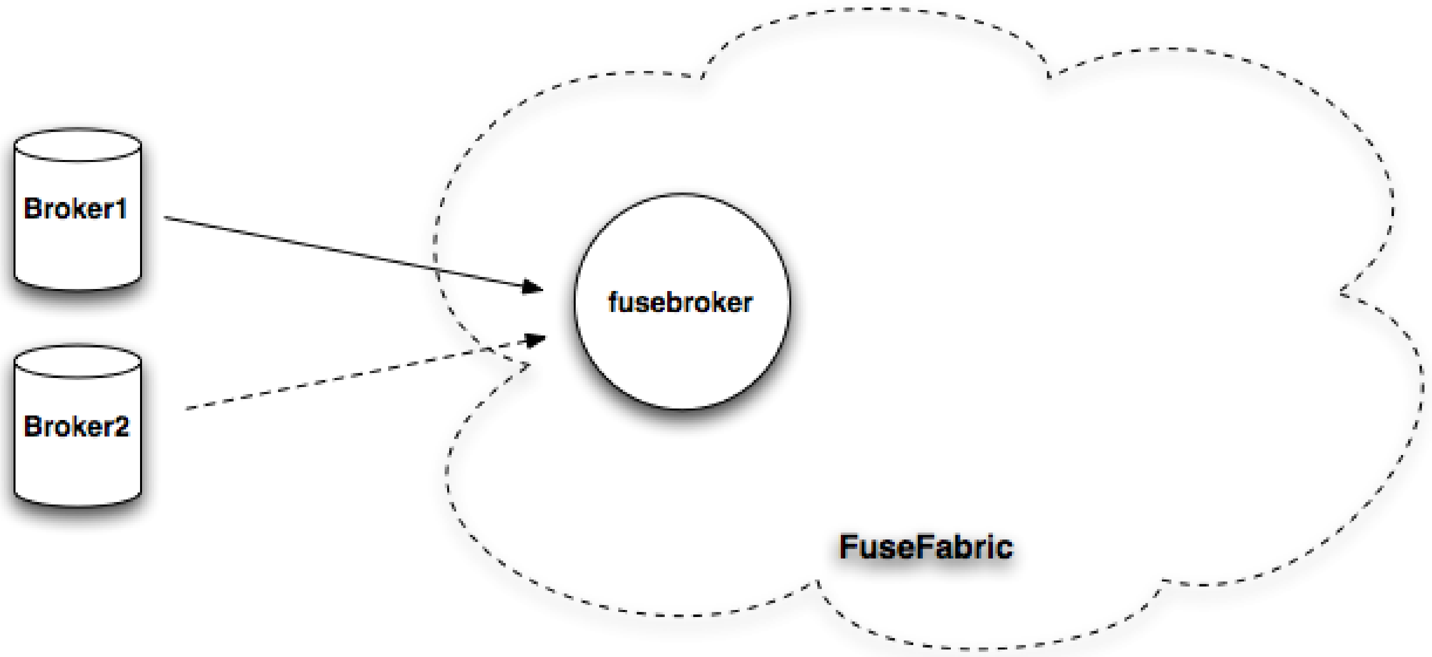
Master/Slave

- Create master slave configuration by starting multiple brokers with the same name (in the same group)
  - First one stared becomes a master
  - Everyone else is a slave
  - Locked on Zookeeper node
  - When master dies, a first slave to get a lock becomes next master

Master/Slave

```
FuseFabric:karaf@root> mq-create --create-container broker1 fusebroker

FuseFabric:karaf@root> mq-create --create-container broker2 fusebroker
```



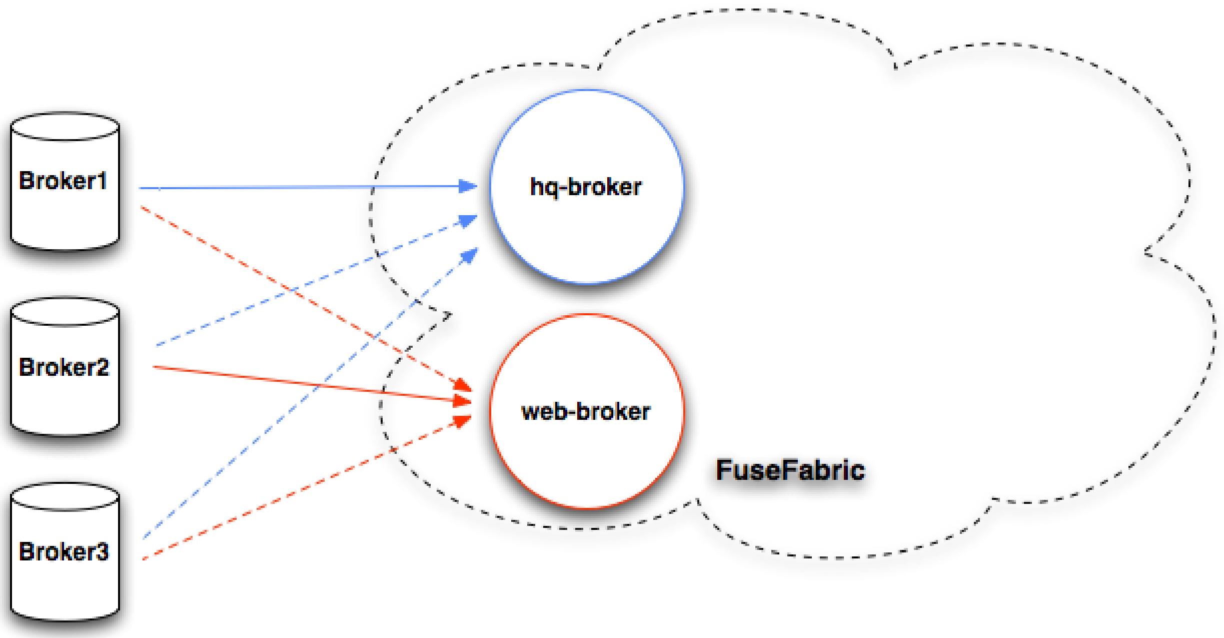
Master/Slave

- No more relying on shared storage locking
- You’ll still need shared storage for preserving the state among brokers
- Easy creating non-persistent master slave configurations
- Clients again don’t need to know topology as fabric discovery will do that work

Master/Slave

- Multiple master slave over the same containers
  - Resource utilization

```
mq-create --create-container broker1,broker2,broker3 hq-broker
mq-create --assign-container broker1,broker2,broker3 web-broker
```



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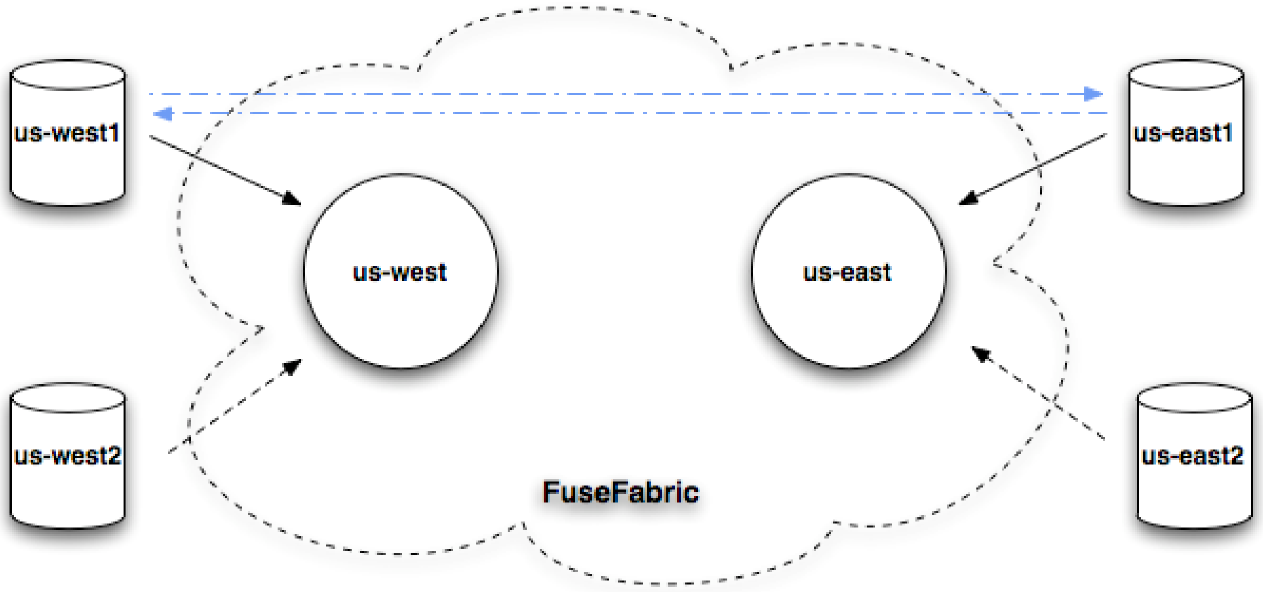
Networks

- Controlled through profile
- Uses fabric discovery, just as clients

```
mq-create --group us-east --networks us-west --create-container us-east1,us-east2 us-east

mq-create --group us-west --networks us-east --create-container us-west1,us-west2 us-west
```

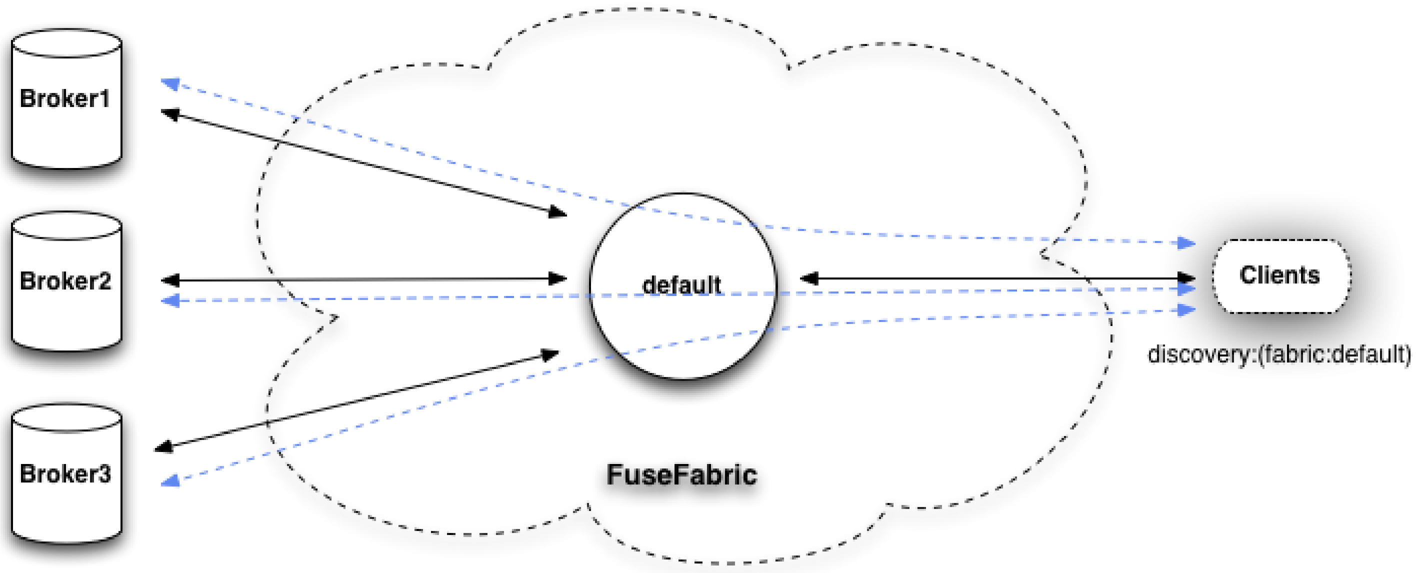


Elastic clusters

- Request-reply pattern over JMS
- Load Balance Traffic
- Non-persistent, not-connected brokers
- Elastic cluster
  - Allow adding new brokers, without updating clients
  - Allow rebalancing of clients

Elastic clusters

```
mq-create --create-container broker1 broker1
mq-create --create-container broker2 broker2
mq-create --create-container broker3 broker3
```



Tooling

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Fuse Management Console

- Centralized Unified Console
- Web UI for managing and monitoring infrastructure
- Uses Fabric to discover resources
- Features
  - Container Management
  - Profile Management
  - Centralized Security
  - Centralized Monitoring

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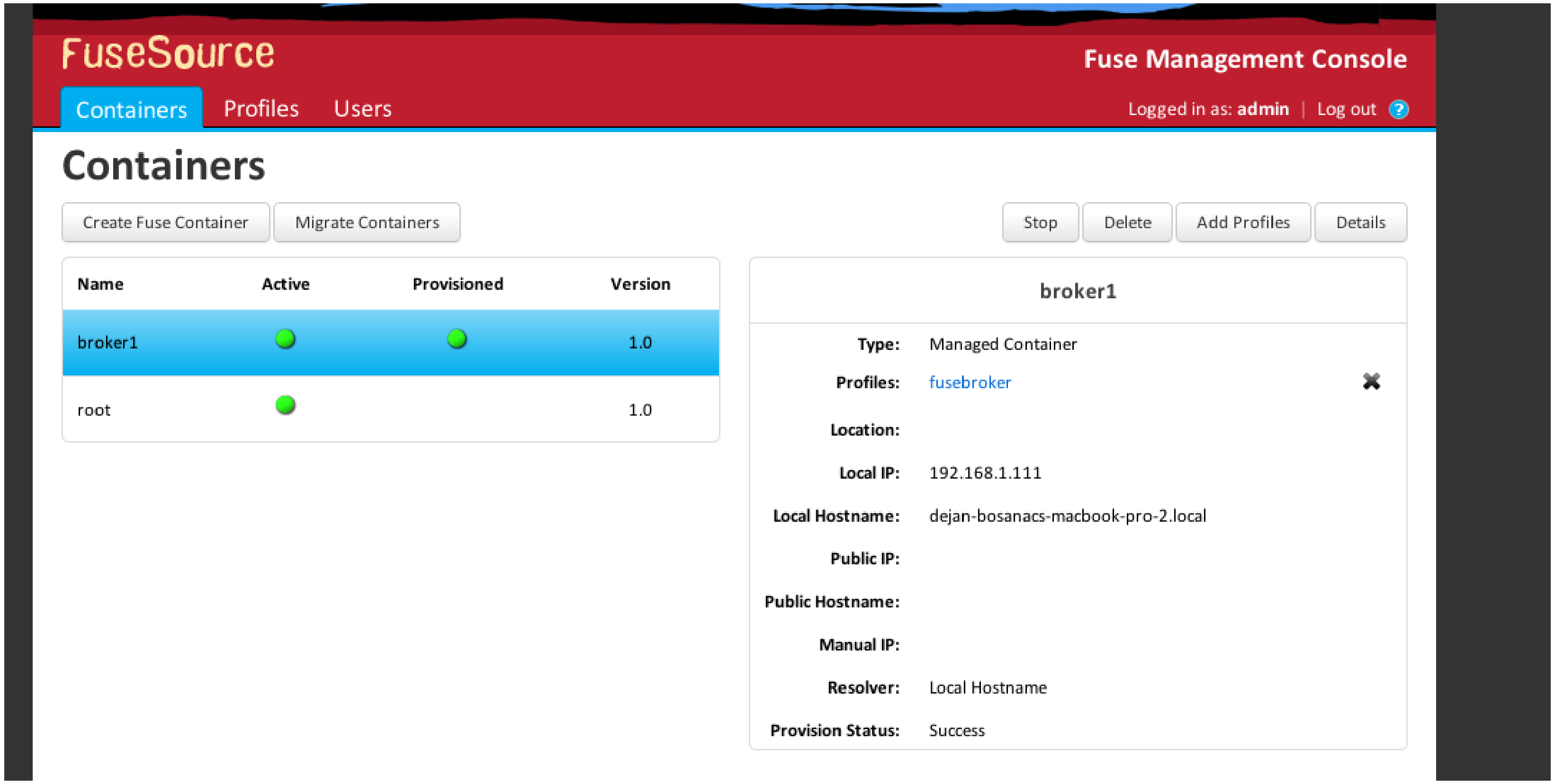
FMC – containers



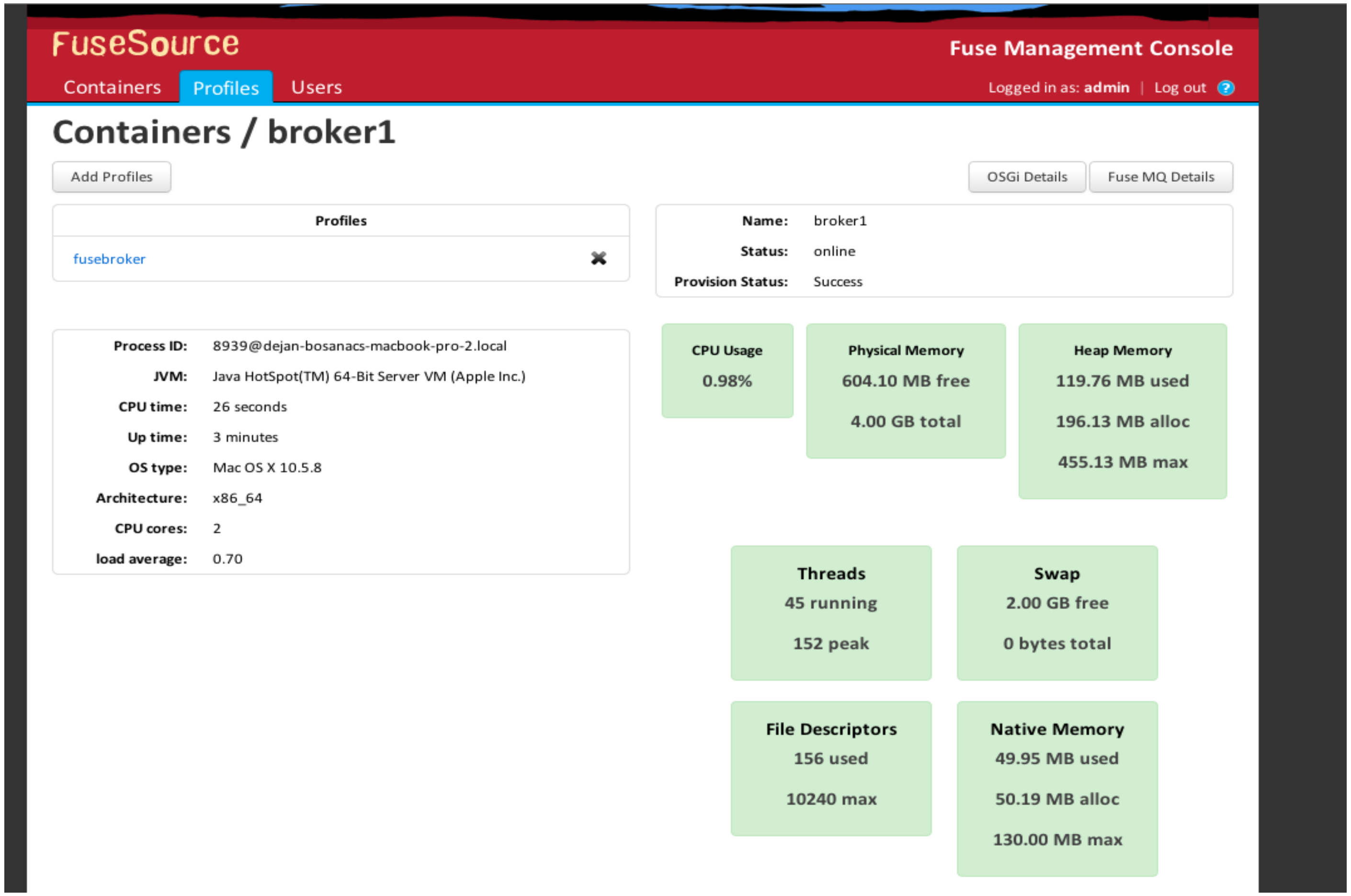
Containers

Name	Active	Provisioned	Version
broker1	●	●	1.0
root	●		1.0

broker1

Type:	Managed Container
Profiles:	fusebroker
Location:	
Local IP:	192.168.1.111
Local Hostname:	dejan-bosanacs-macbook-pro-2.local
Public IP:	
Public Hostname:	
Manual IP:	
Resolver:	Local Hostname
Provision Status:	Success

FMC – Container



Containers / broker1

Profiles
fusebroker

Name:	broker1
Status:	online
Provision Status:	Success

Process ID:	8939@dejan-bosanacs-macbook-pro-2.local
JVM:	Java HotSpot(TM) 64-Bit Server VM (Apple Inc.)
CPU time:	26 seconds
Up time:	3 minutes
OS type:	Mac OS X 10.5.8
Architecture:	x86_64
CPU cores:	2
load average:	0.70

CPU Usage
0.98%

Physical Memory
604.10 MB free
4.00 GB total

Heap Memory
119.76 MB used
196.13 MB alloc
455.13 MB max

Threads
45 running
152 peak

Swap
2.00 GB free
0 bytes total

File Descriptors
156 used
10240 max

Native Memory
49.95 MB used
50.19 MB alloc
130.00 MB max

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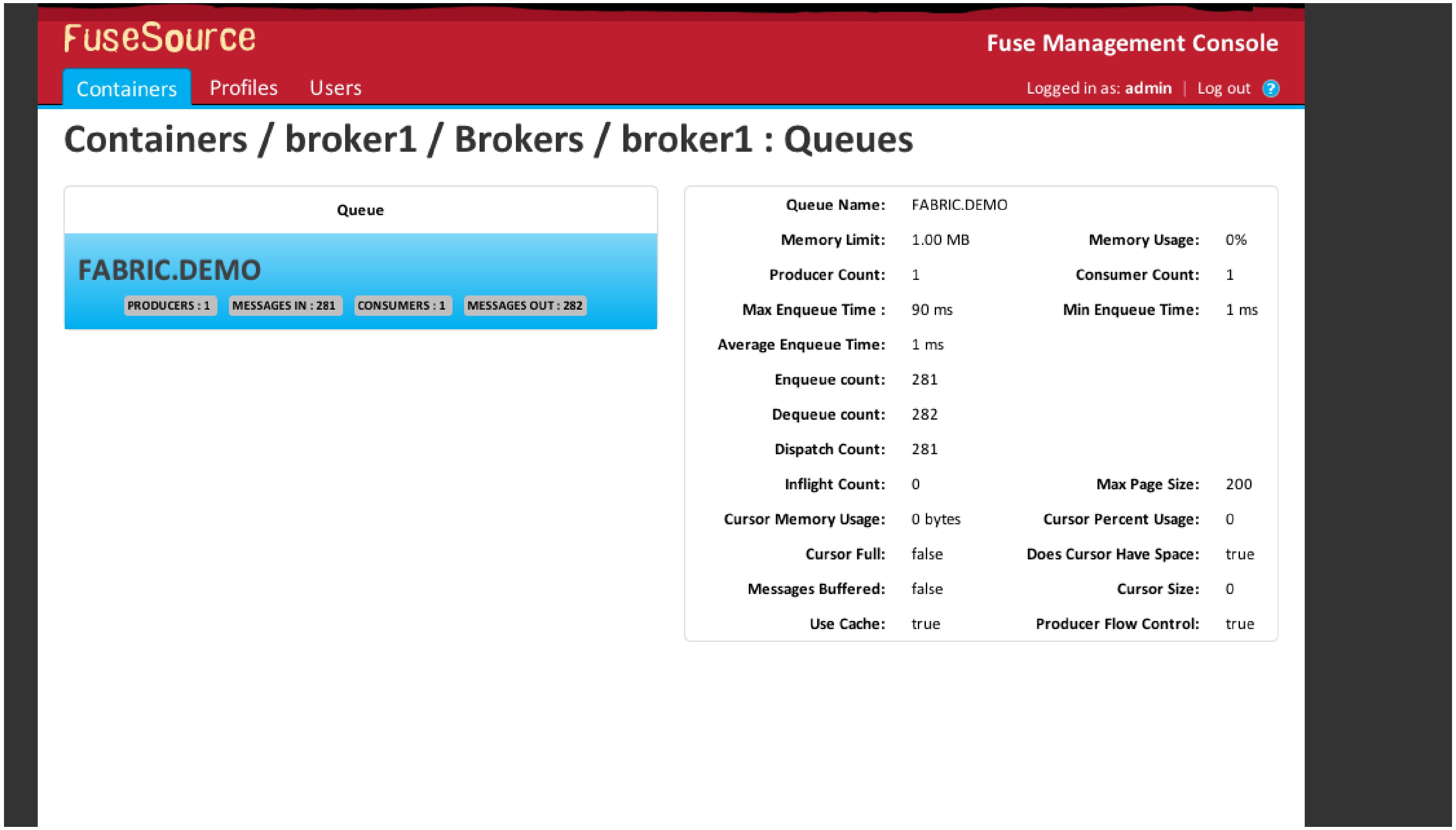
FMC – broker view



Containers / broker1 / Brokers / broker1 : Queues

Queue
FABRIC.DEMO
PRODUCERS : 1 · MESSAGES IN : 281 · CONSUMERS : 1 · MESSAGES OUT : 282

Queue Name:	FABRIC.DEMO		
Memory Limit:	1.00 MB	Memory Usage:	0%
Producer Count:	1	Consumer Count:	1
Max Enqueue Time :	90 ms	Min Enqueue Time:	1 ms
Average Enqueue Time:	1 ms		
Enqueue count:	281		
Dequeue count:	282		
Dispatch Count:	281		
Inflight Count:	0	Max Page Size:	200
Cursor Memory Usage:	0 bytes	Cursor Percent Usage:	0
Cursor Full:	false	Does Cursor Have Space:	true
Messages Buffered:	false	Cursor Size:	0
Use Cache:	true	Producer Flow Control:	true

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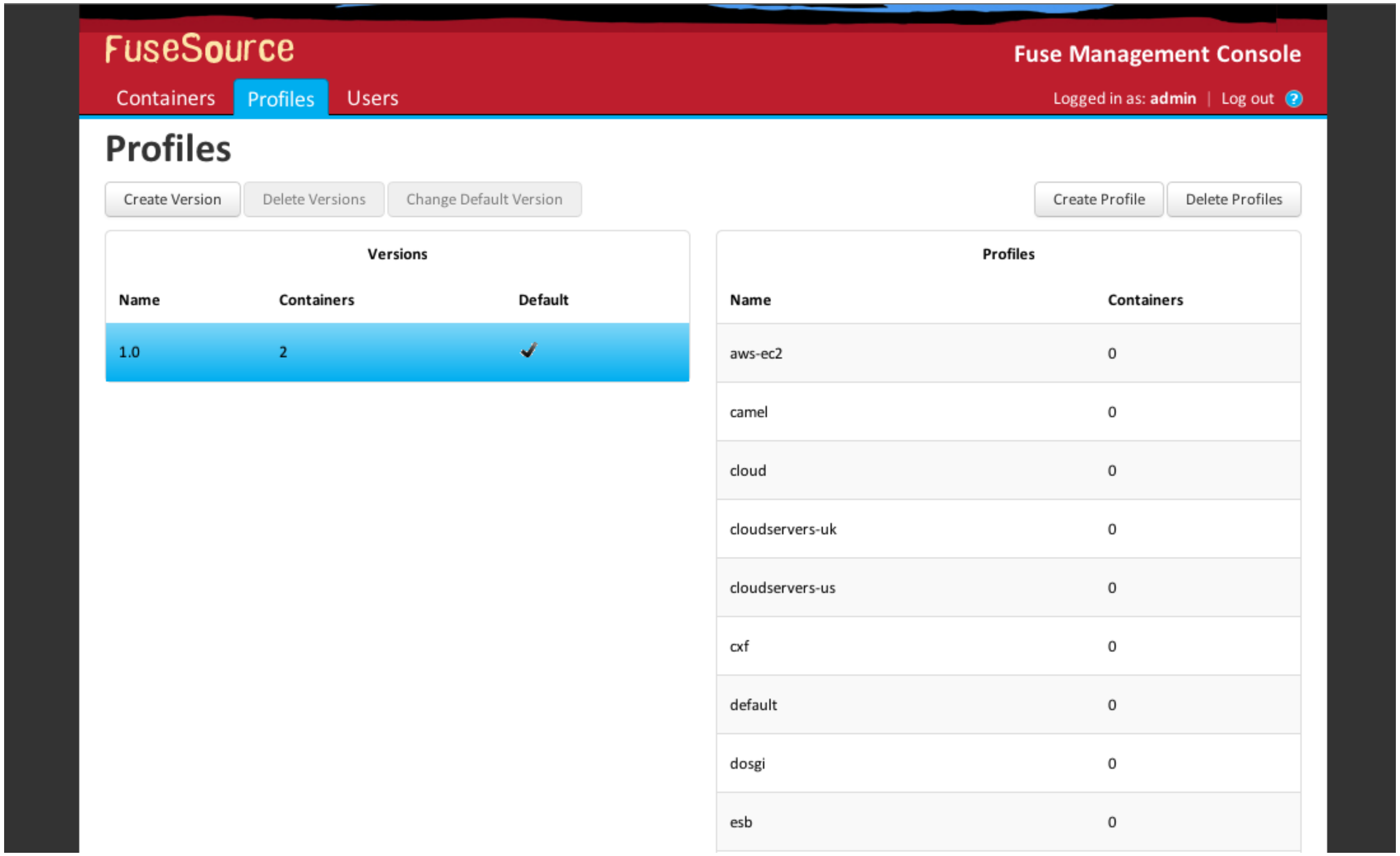
FMC - Profiles



Profiles

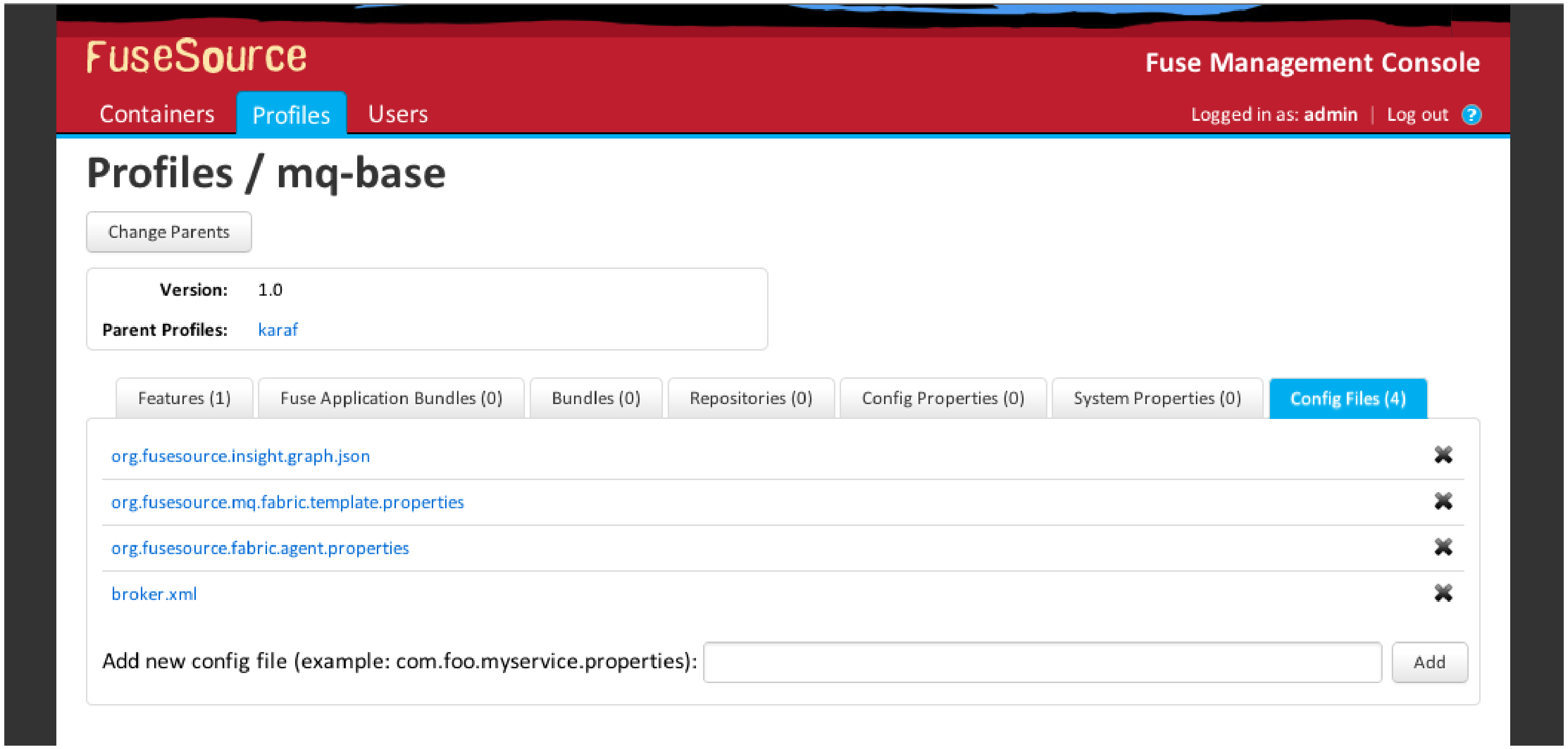
Versions

Name	Containers	Default
1.0	2	✓

Profiles

Name	Containers
aws-ec2	0
camel	0
cloud	0
cloudservers-uk	0
cloudservers-us	0
cxf	0
default	0
dosgi	0
esb	0

FMC - Profile



Profiles / mq-base

Version:	1.0
Parent Profiles:	karaf

- org.fusesource.insight.graph.json
- org.fusesource.mq.fabric.template.properties
- org.fusesource.fabric.agent.properties
- broker.xml

Add new config file (example: com.foo.myservice.properties):

Future

- More things for developers
  - Make it even easier to write applications for Fuse Enterprise
- More things for operations
  - Visualization of clusters
  - Centralized logging (collect and search all logs centrally)

Conclusion

- Helps with complex and large deployments
- Use central registry for distributed configuration and locking
- Make clients location agnostic of brokers (needed for cloud deployments)
- Easy upgrades and updates
- Support for incremental patching
- Tools

Questions

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