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galder@jboss.org | twitter.com/galderz | zamarreno.com

Beyond Peer-to-Peer Data Grids with Infinispan Servers

Galder Zamarreño
Senior Engineer, Red Hat
4th October 2010

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galder@jboss.org | twitter.com/galderz | zamarreno.com

Who is Galder?

- R&D engineer (Red Hat Inc):
  - Infinispan developer
  - JBoss Cache developer
- Contributor and committer:
  - JBoss AS, Hibernate, JGroups, JBoss Portal,...etc
- Blog: zamarreno.com
- Twitter: @galderz

Agenda

- Introduction to Infinispan
- Peer-to-peer (P2P) data grids vs client-server
- Infinispan server comparison
- The path ahead for Infinispan servers
- Demo

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What is Infinispan?

- A data grid platform which is:
  - Open Source (LGPL)
  - In-memory
  - Distributed
  - Elastic
  - Highly Available

Infinispan

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Brief feature overview

- Seamless data distribution, linearly scalable data structures
- Implicit eviction
- Write through and write behind to persistent storage
- JTA and XA transactions
- Listeners and notifications
- Querying and indexing
- Alternative JPA-like API
- JMX management and GUI console
- Multiple endpoints for remote invocations...

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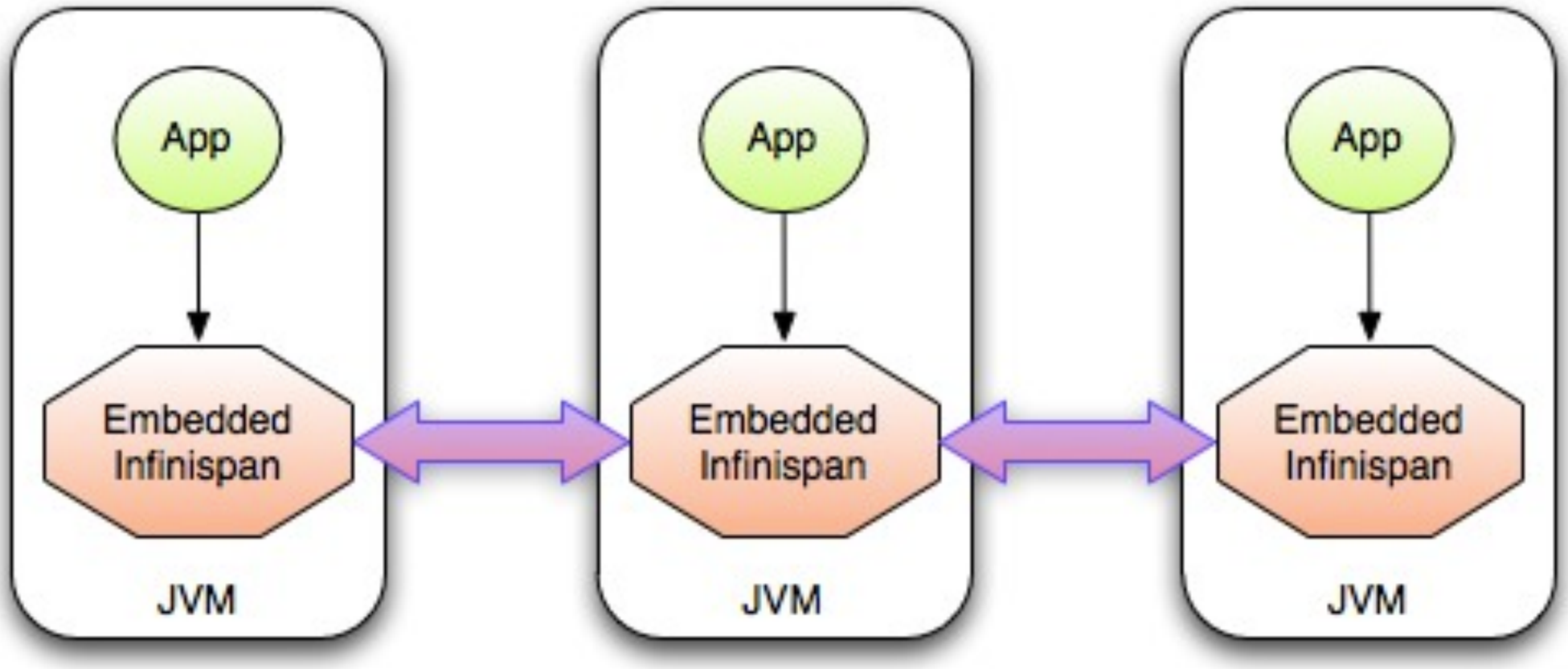
Peer-to-Peer Setup



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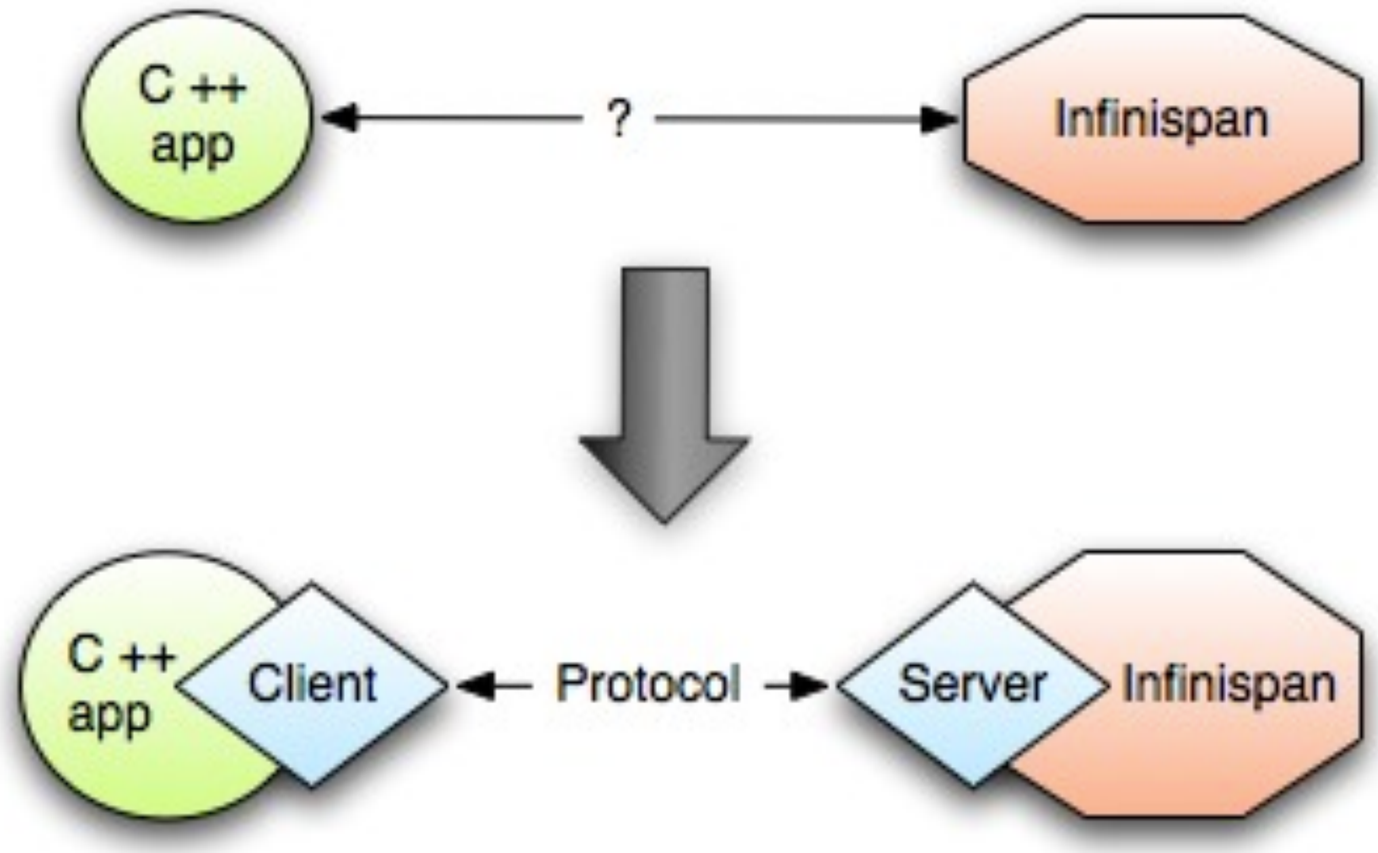
Non-JVM access



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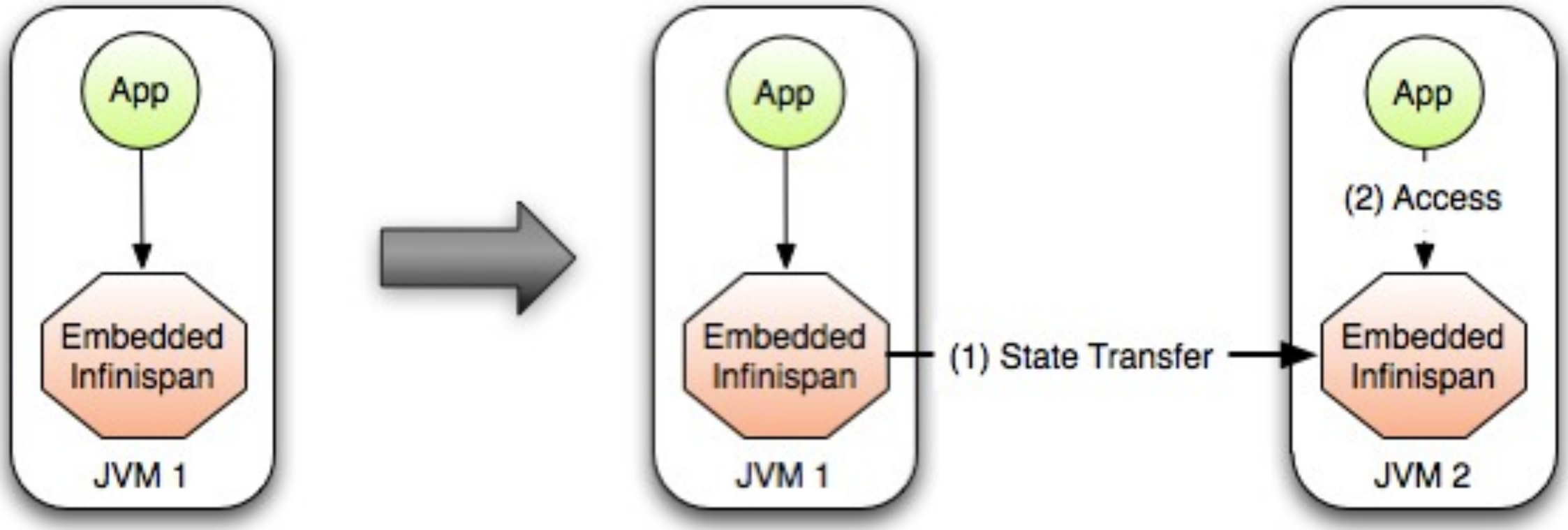
Elasticity problems with P2P



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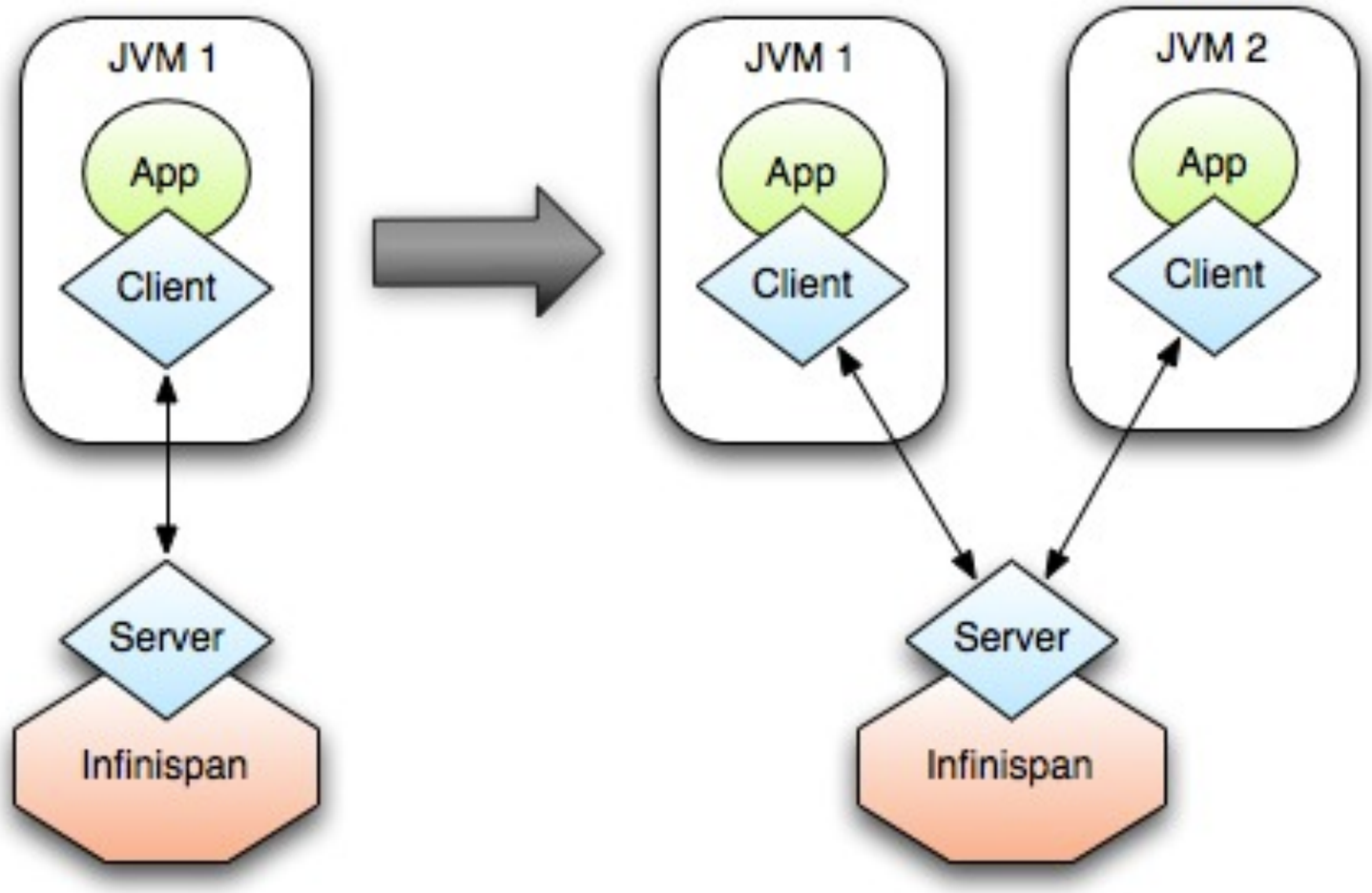
Client-Server brings Elasticity



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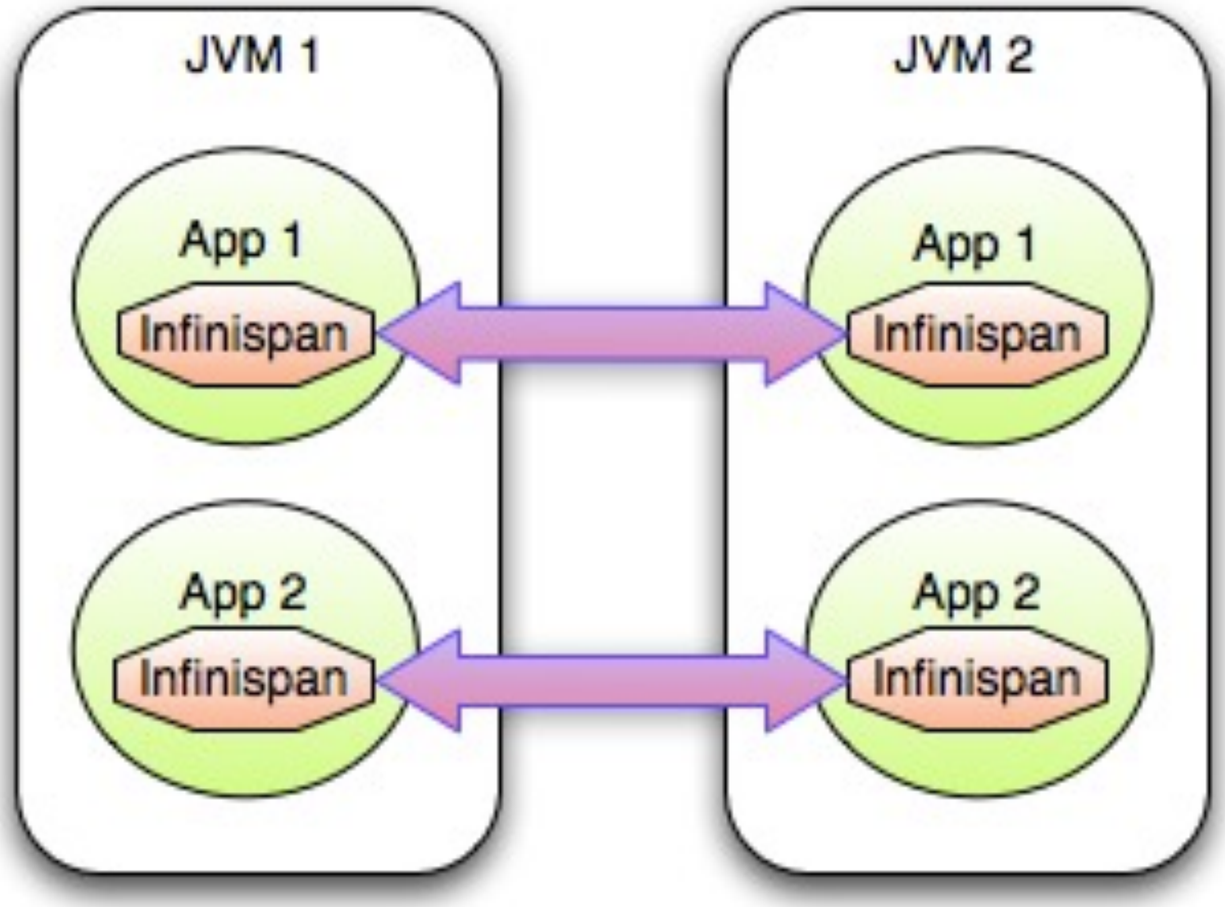
Data Grid per Application?



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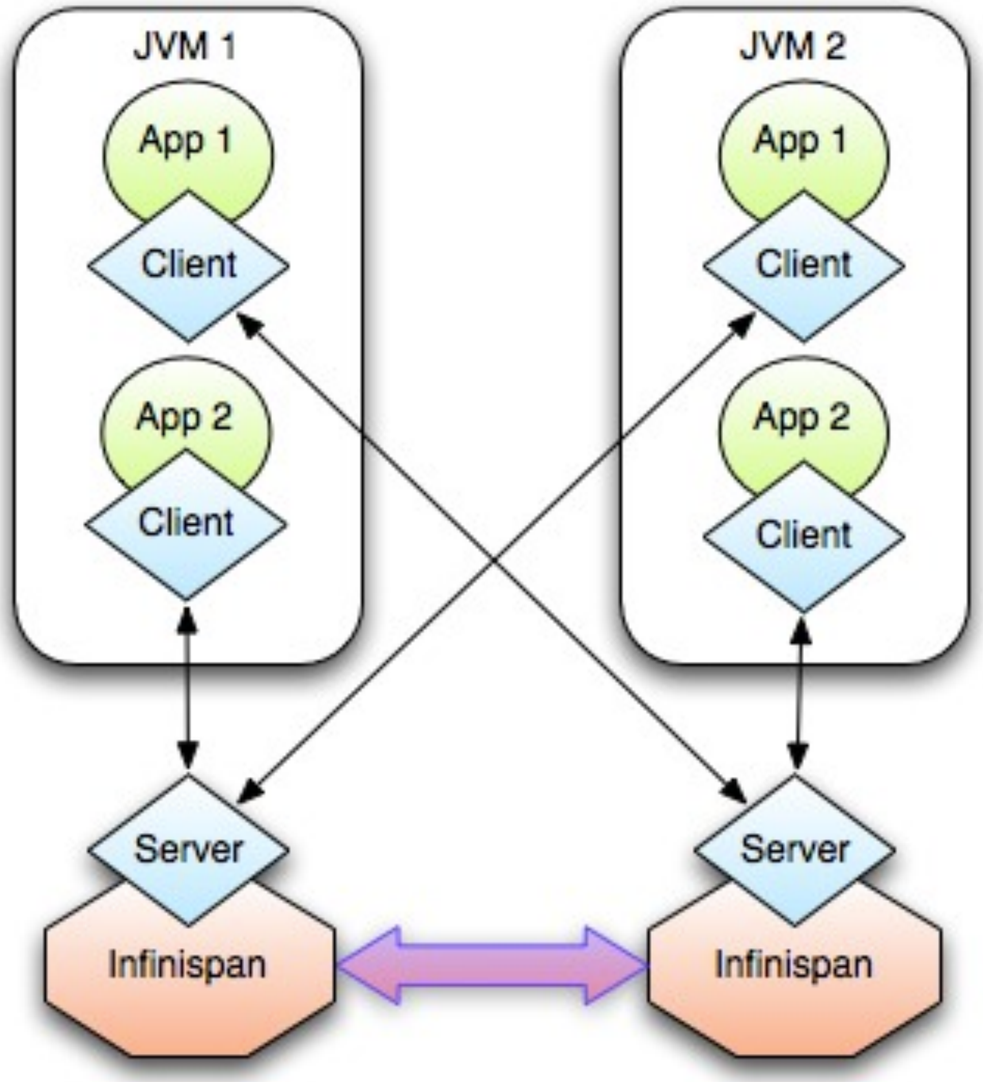
Shared Data Grid



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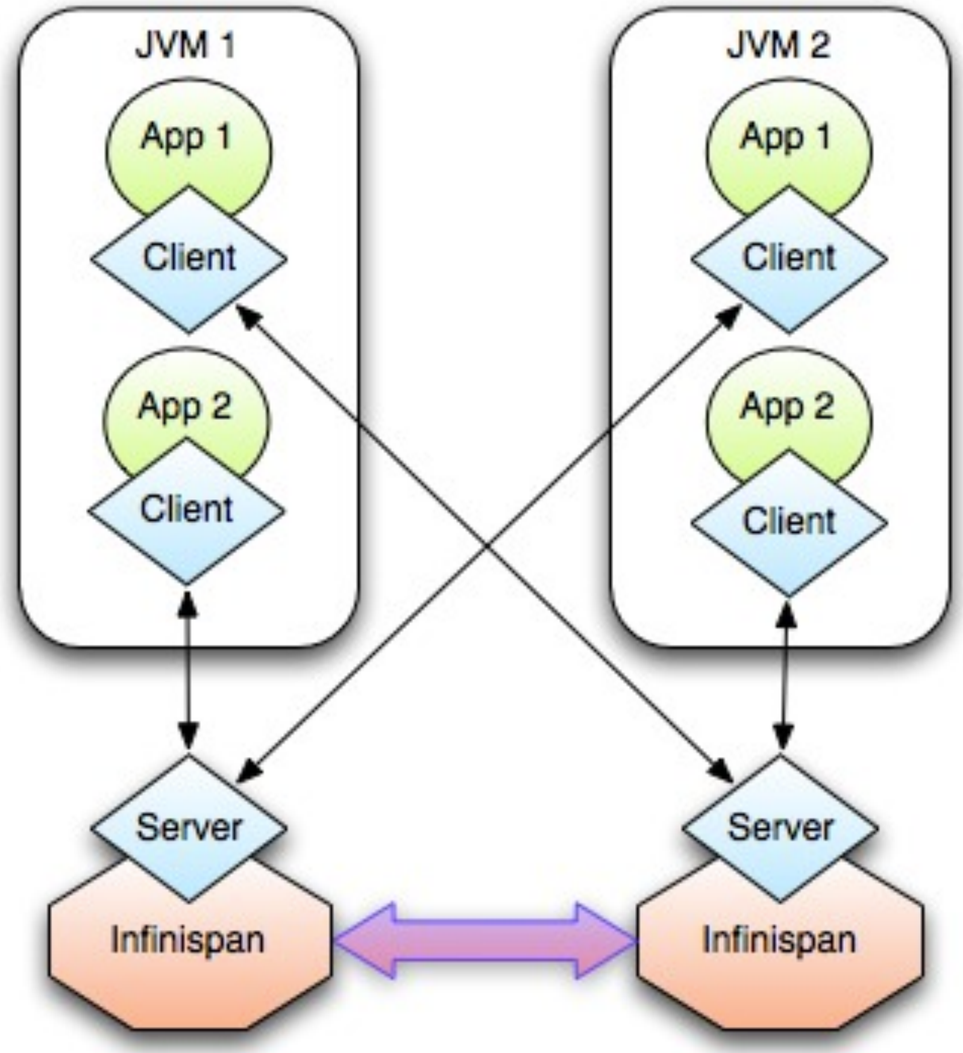
Independent Tier Management

- Independently deploy new app version
- Security
- Incompatible JVM tuning requirements



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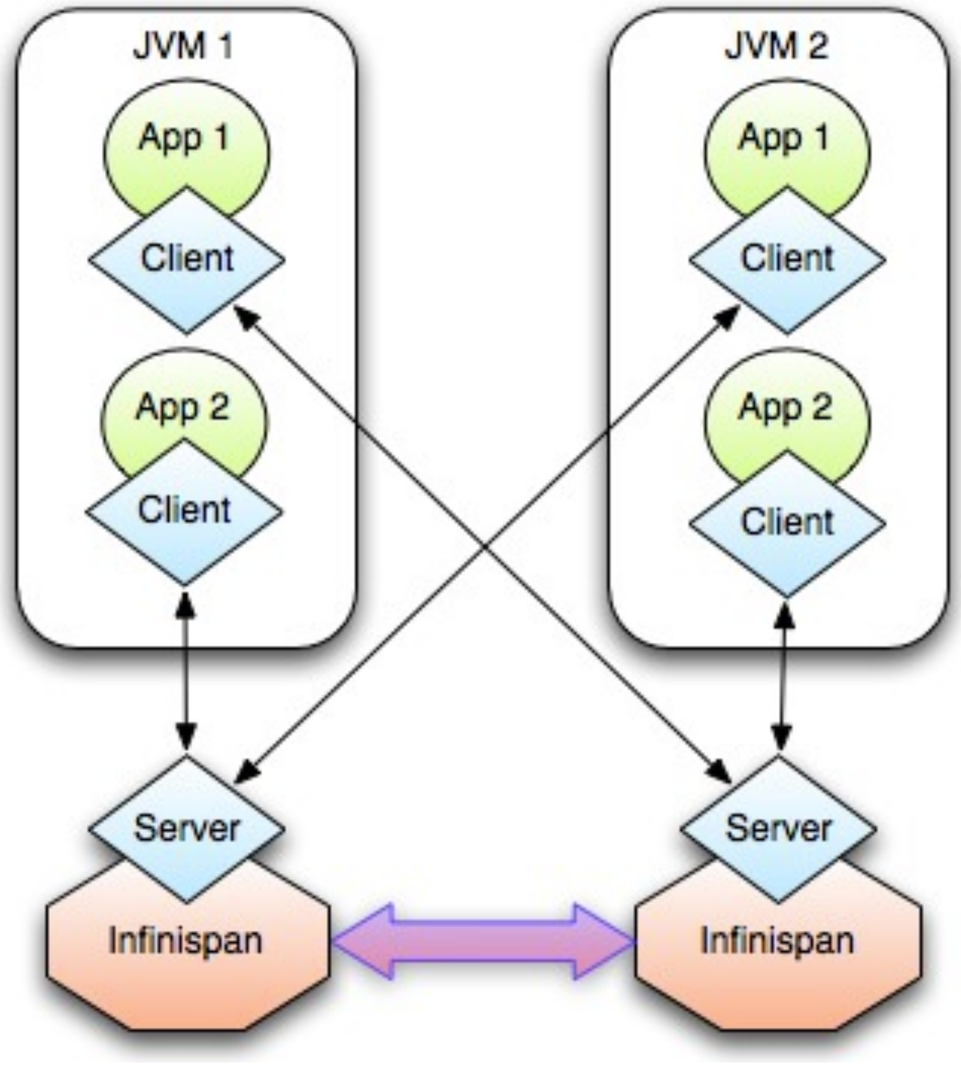
Infinispan Server Modules

- Protocols supported in 4.1 :
  - REST
  - Memcached
  - Hot Rod
  - Websocket



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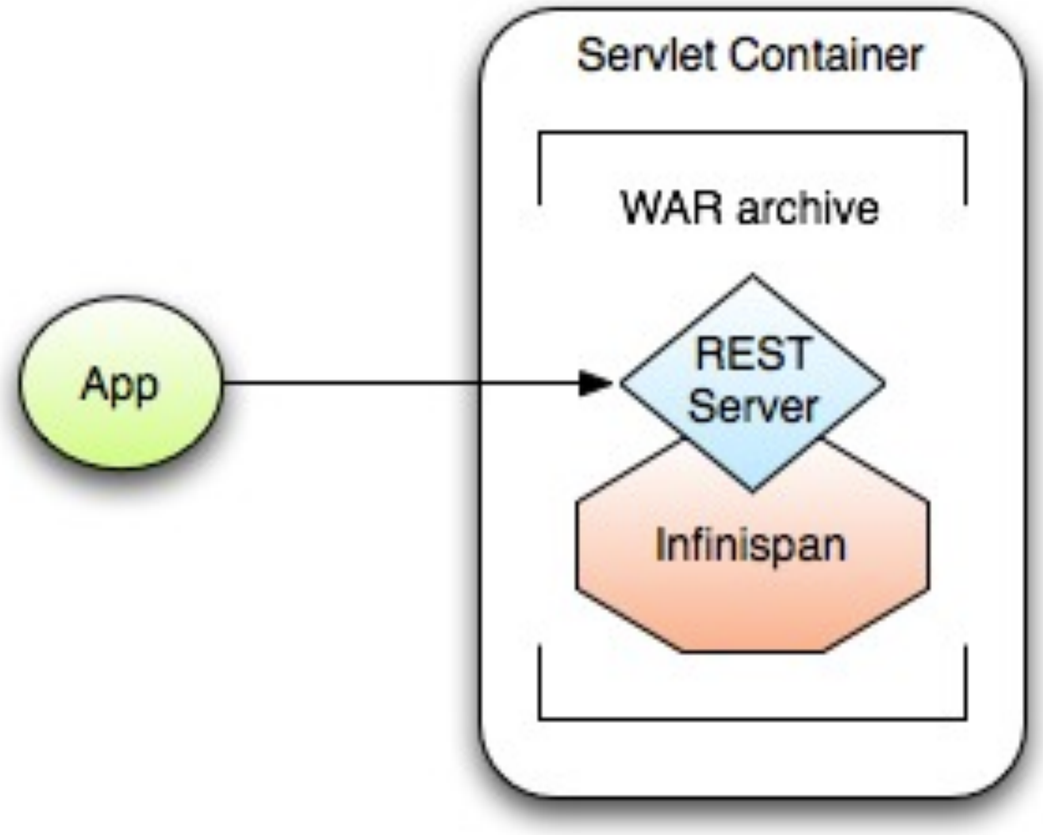
REST Server

- RESTful HTTP access
  - HTTP PUT/POST to store
  - HTTP GET to retrieve
  - Available since 4.0
    - In ‘all’ distribution



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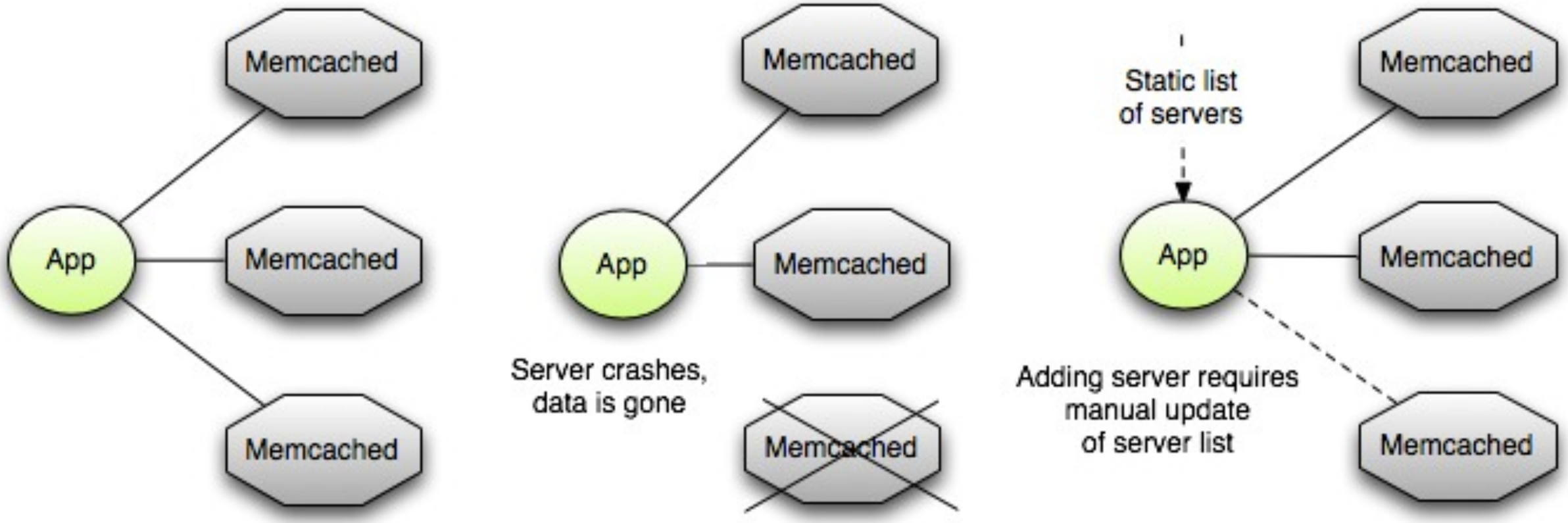
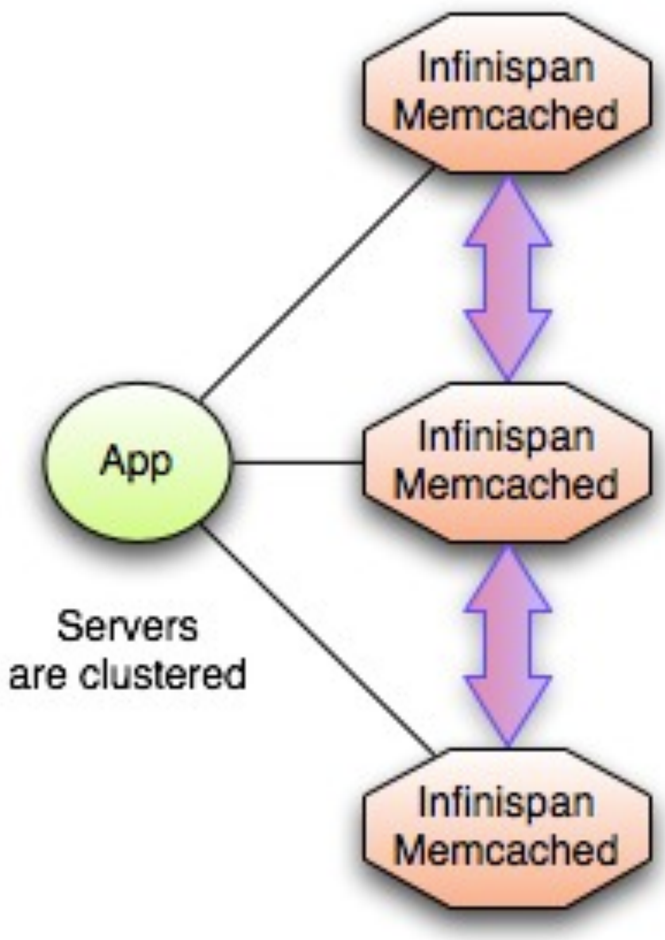
REST Server via Python

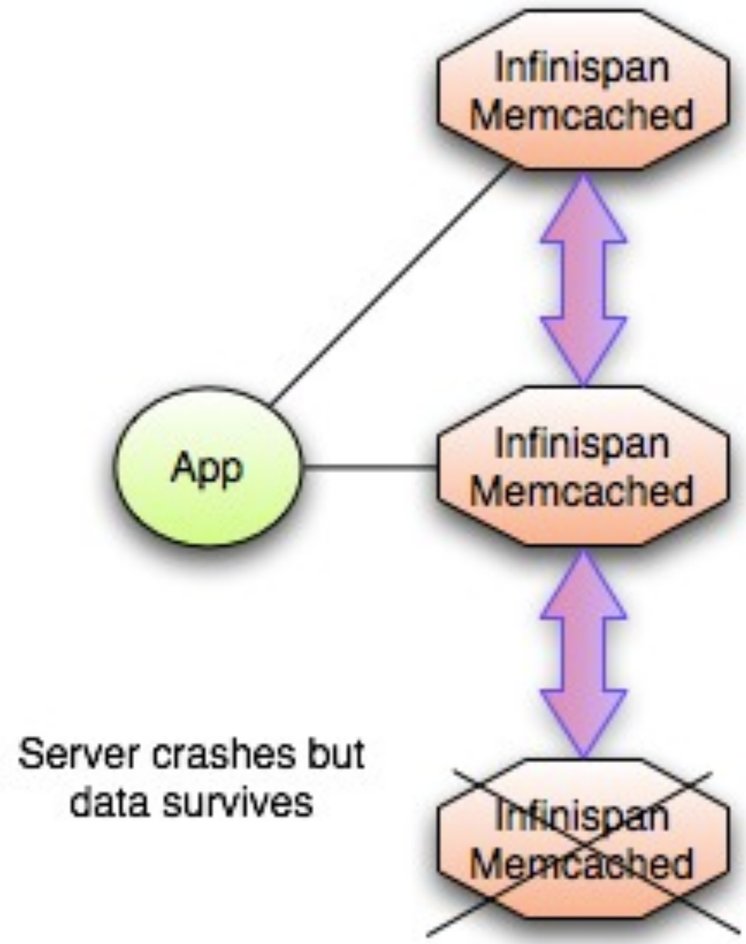
```python
#
# Sample python code using the standard http lib only
#

import httplib


#putting data in
conn = httplib.HTTPConnection("localhost:8080")
data = "SOME DATA HERE !" #could be string, or a file...
conn.request("POST", "/infinispan/rest/Bucket/0", data,
   {"Content-Type": "text/plain"})
response = conn.getresponse()
print response.status

#getting data out
import httplib
conn = httplib.HTTPConnection("localhost:8080")
conn.request("GET", "/infinispan/rest/Bucket/0")
response = conn.getresponse()
print response.status
print response.read()
```

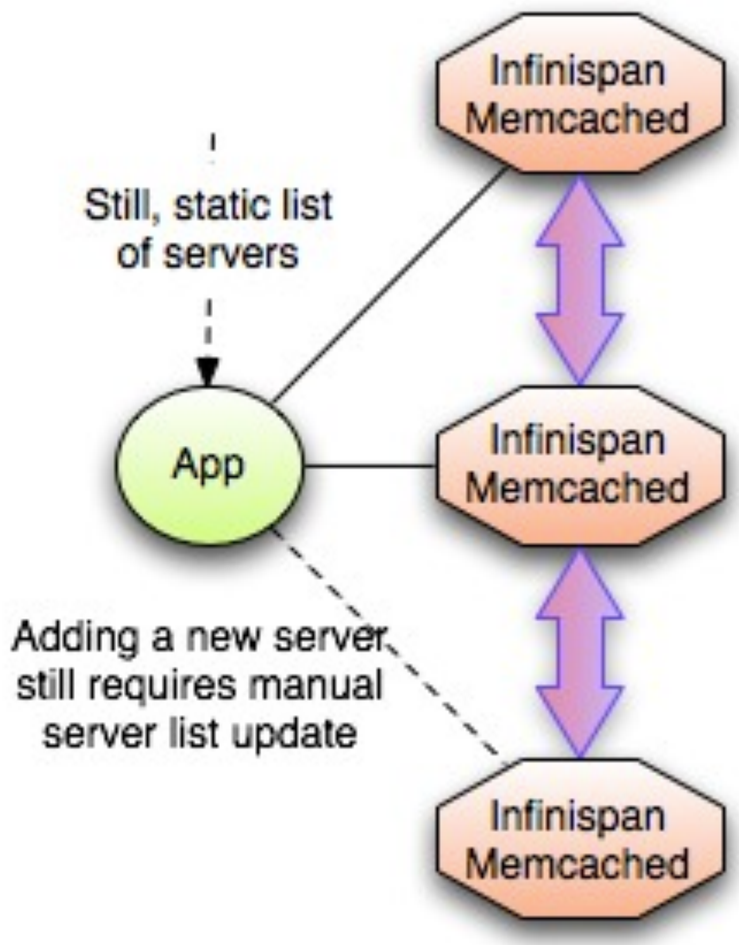
Memcached not good enough



Infinispan Memcached







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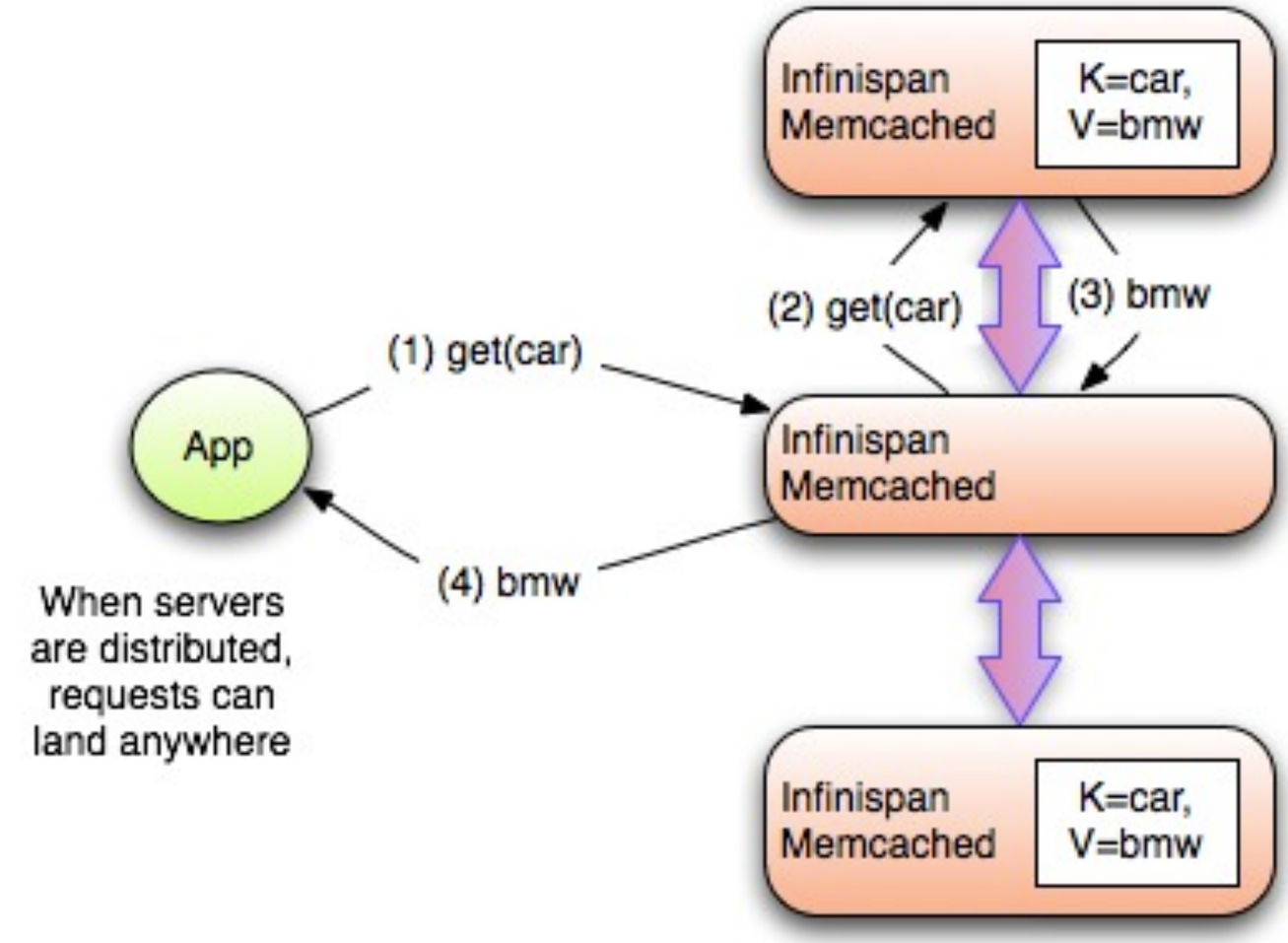
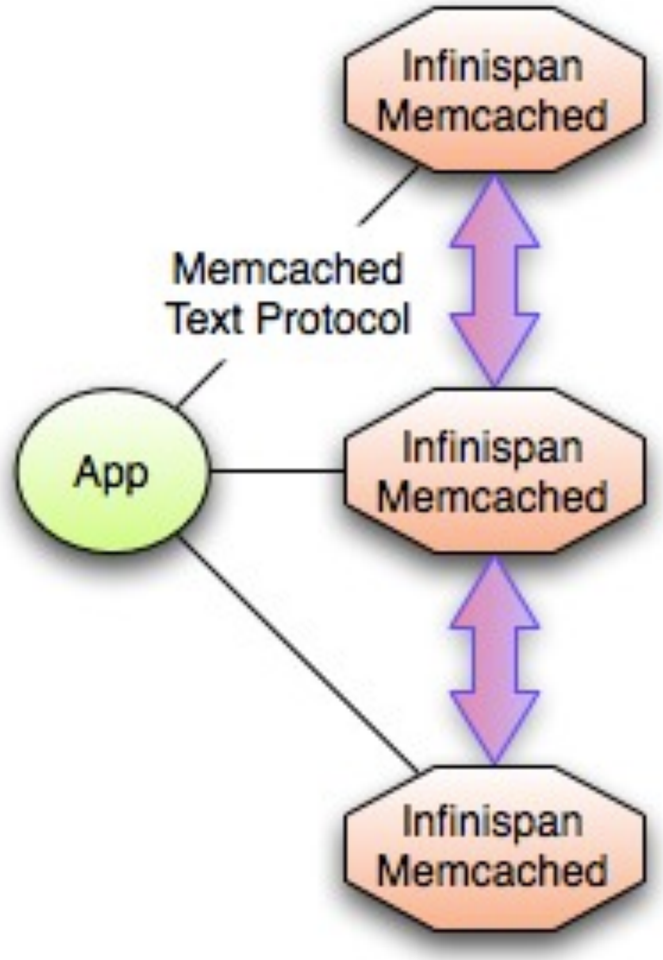
Routing not so smart



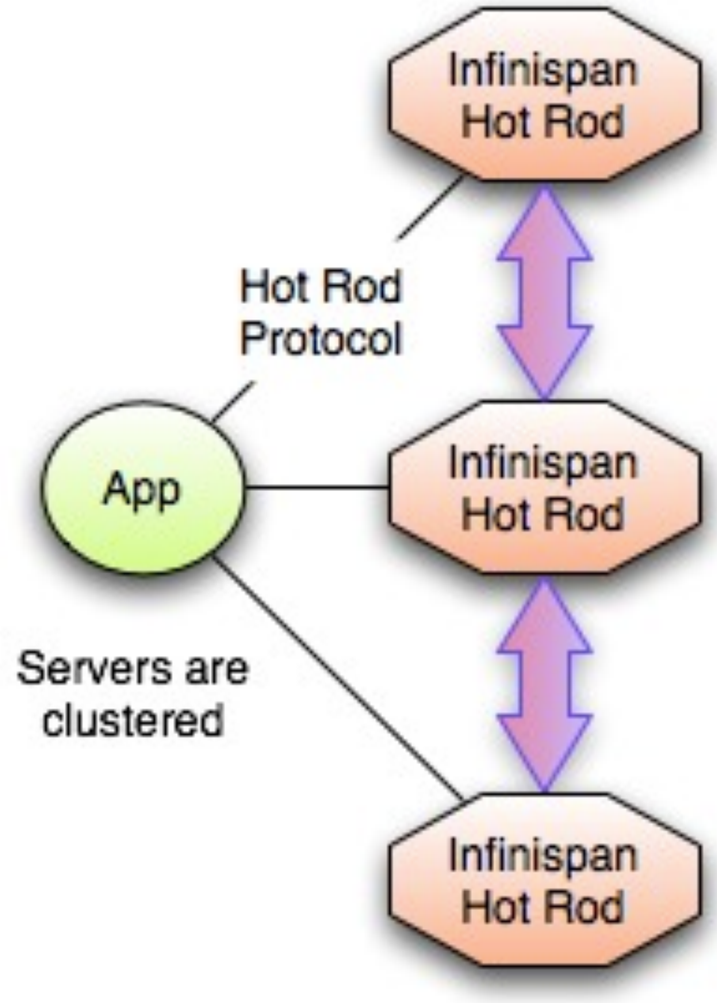
Essential Information

- To run, execute:
  - `startServer.sh -r memcached`
- New in 4.1
- Only text protocol supported
- Works with any Memcached client



Hot Rod to the rescue!

- What is Hot Rod?
  - Wire protocol for client-server communications
  - Open and language independent
  - Built-in dynamic failover and load balancing
  - Smart routing



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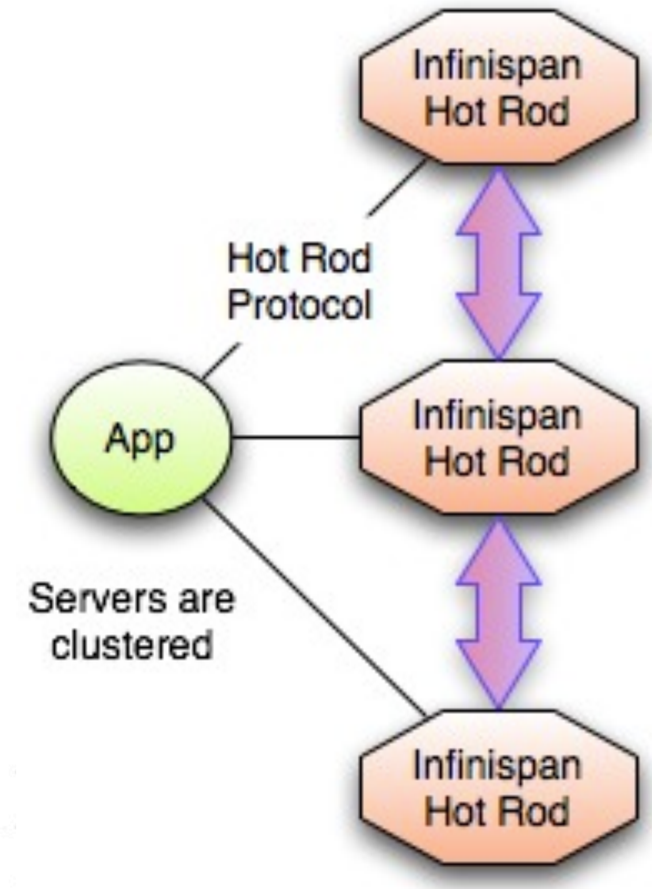
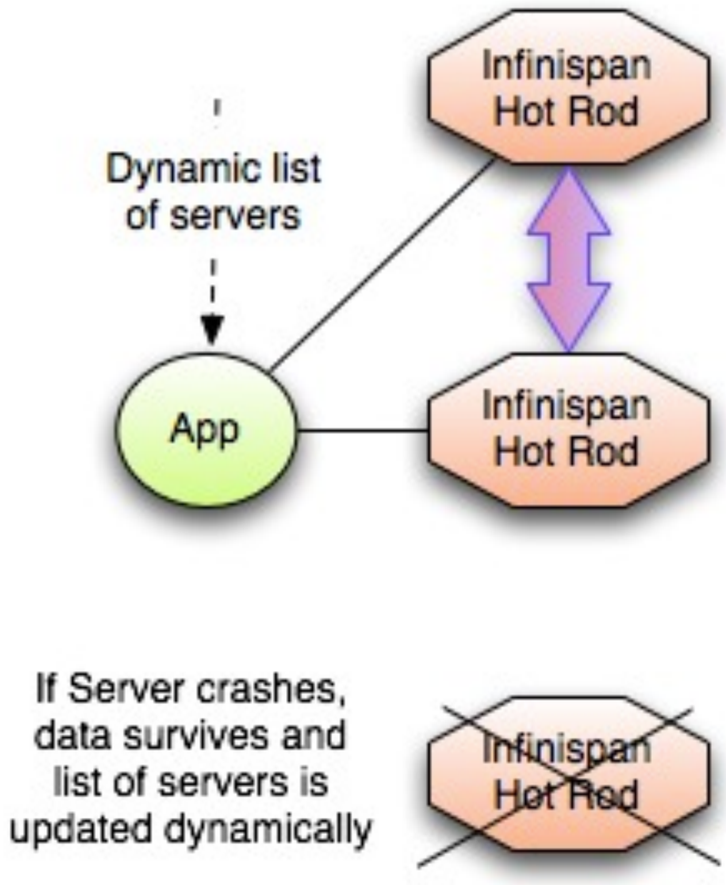
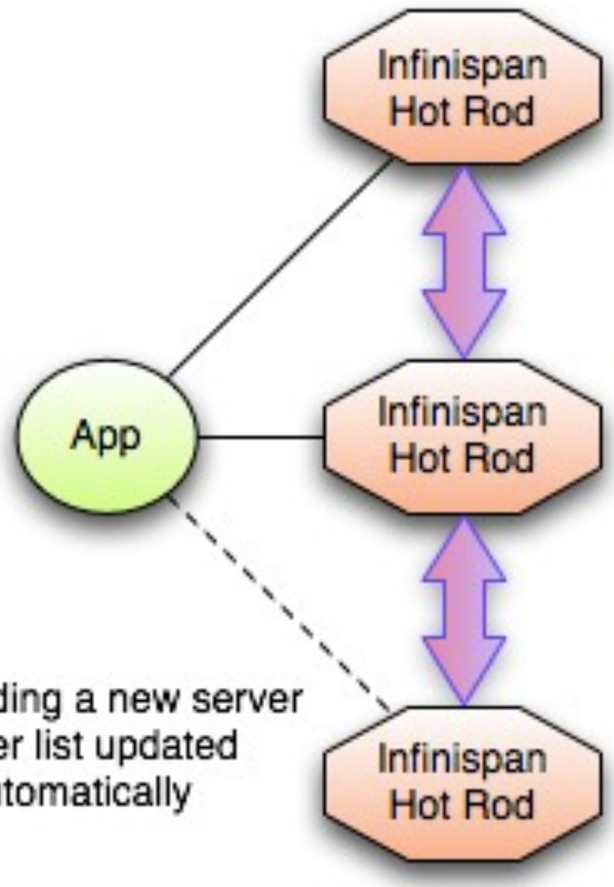
Dynamic routing with Hot Rod







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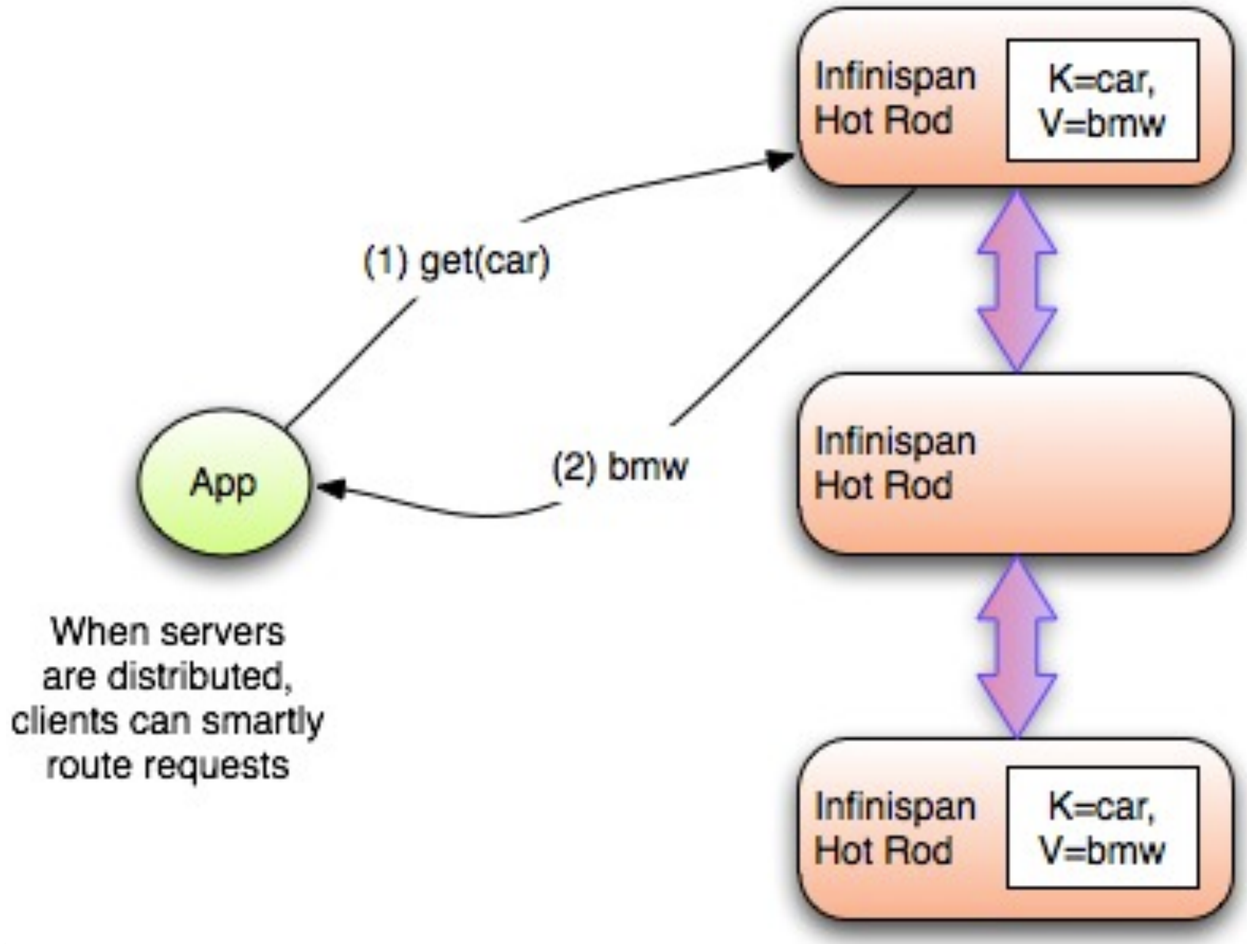
Smart routing with Hot Rod



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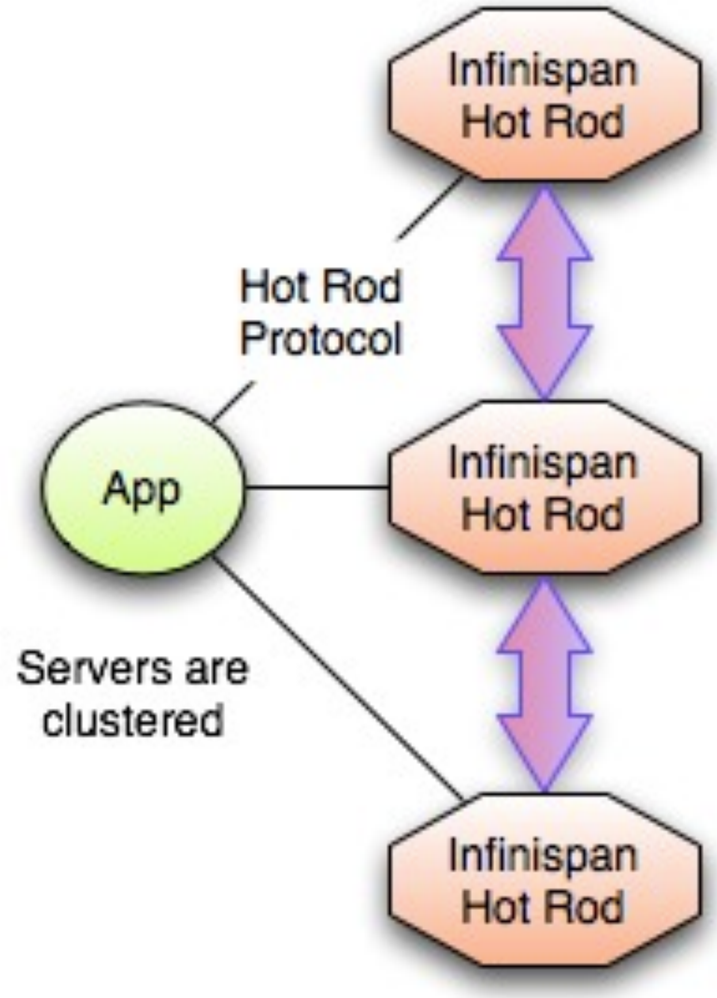
Essential Information

- To run:
  - `startServer.sh -r hotrod`
- New in 4.1
- Only a Java client available:
  - Supports smart routing and dynamic load balancing



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Java Hot Rod Client

```
//API entry point, by default it connects to localhost:11311
CacheContainer cacheContainer = new RemoteCacheManager();

//obtain a handle to the remote default cache
Cache<String, String> cache = cacheContainer.getCache();

//now add something to the cache and make sure it is there
cache.put("car", "bmw");
assert cache.get("car").equals("bmw");

//remove the data
cache.remove("car");
assert !cache.containsKey("car") : "Value must have been removed!";
```


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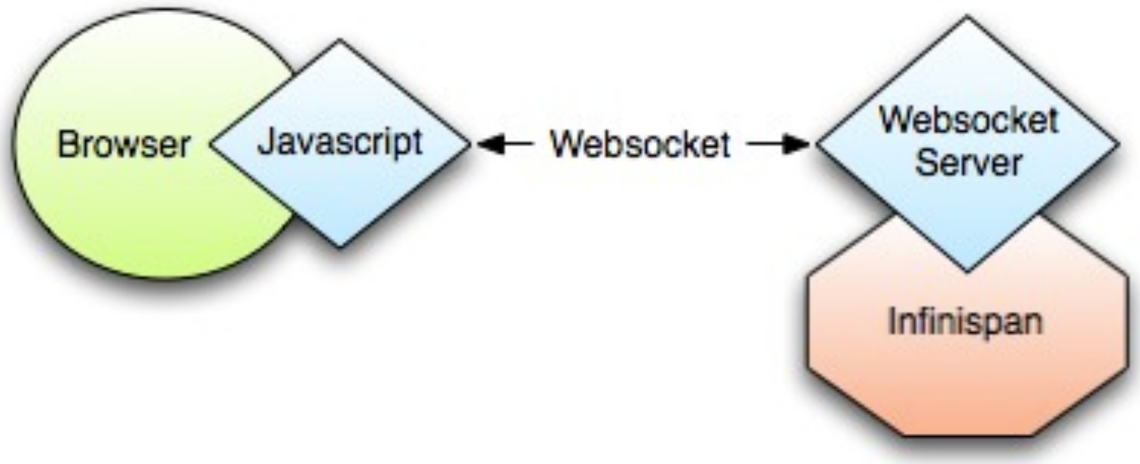
Websocket Server

- Exposes Infinispan Cache instance over Websocket
- To run it:
  - `startServer.sh -r websocket`
- Accessible via Javascript API



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Server Comparison

	Protocol	Client Libraries	Clustered ?	Smart Routing	Load balancing / Failover
REST	Text	N/A	Yes	No	Any HTTP load balancer
Memcached	Text	Plenty	Yes	No	Only with predefined server list
Hot Rod	Binary	Currently only Java	Yes	Yes	Dynamic
Websocket	Text	Javascript	Yes	No	Any HTTP load balancer

The path ahead

- Hot Rod improvements:
  - Remote querying
  - Event handling
- Submit Hot Rod protocol to standards body (maybe)
- Others:
  - Memcached binary protocol won’t be implemented

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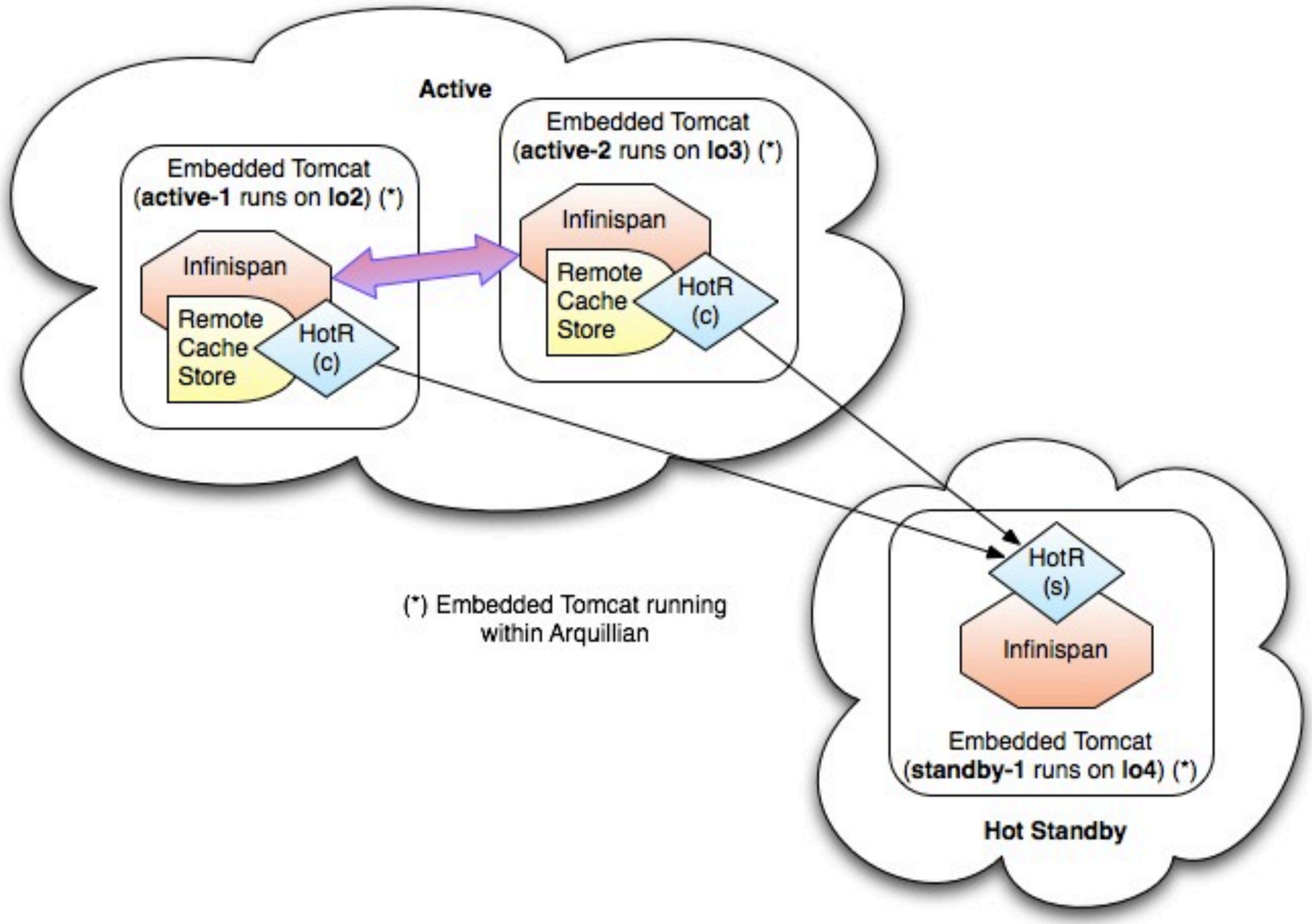
Prototype Hot Standby Demo



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Summary

- Accessing data grids in client-server mode makes sense
- Infinispan 4.1 comes with a range of server modules
- Each server fits one type of use case
- We need your help to build more Hot Rod clients!

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