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Bringing Business to the Cloud

Wide-area Migration with Monterey, AS7, Seam and jclouds

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31 October 2011

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Cloudsoft Corporation

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Company Intro

- **Who are Cloudsoft?**
  - **Venture-backed** software company headquartered in **UK**
  - **Experienced team**
    - **Management team:** Duncan Johnston-Watt (CEO & founder), Alex Heneveld (CTO & co-founder), Adrian Cole (Chief Evangelist; jclouds.org founder), Aled Sage (VP Engineering)
    - **Non-exec team:** Derek Gray (UK), Shawn Findlan (NY), Linda Bernardi (MA), Rich Miller (CA), John Mathon (CA), Erik Troan (NC), Lawrence Rosen (CA)
  - **Recognised by**
    - **Gartner:** Cool Vendor 2011 (application and integration platforms)
    - **Forrester:** leading enabler of Elastic Application Fabrics
    - **Patents:** holder of several patents in key jurisdictions

- **What do we do?**
  - Cloudsoft's mission is to **help enterprises** make the most of cloud
    - **Large-scale, globally distributed** applications
    - **Complex, multi-tier, transactional, high-throughput** applications
  - We develop, sell, and support a **middleware platform** that simplifies the **development** and **runtime deployment and management** of such applications

Overview

Combining CDI, JBoss, Monterey, and jclouds:

- **CDI is great for wiring business logic together**
- **JBoss is a modular, powerful app-server**
- **Monterey is a dynamic wide-area processing fabric**
- **jclouds abstracts cloud APIs**

Combination gives you best-of-breed for different parts of app

- **Eliminate database performance bottlenecks**
- **Get consistency and transactional guarantees without sacrificing high-throughput**
- **Continue to focus on just writing business logic**

Simple CDI Example

```
public class Printer {

    @Inject Hello hello;

    public void printHello() {
        System.out.println( hello.sayHello("world") );
    }
}
```

`@Inject` defines an injection point. `@Default` qualifier is assumed

Simple JPA Example

```
@Entity
public class Customer { ... }
```

Annotations describe the persist mapping.

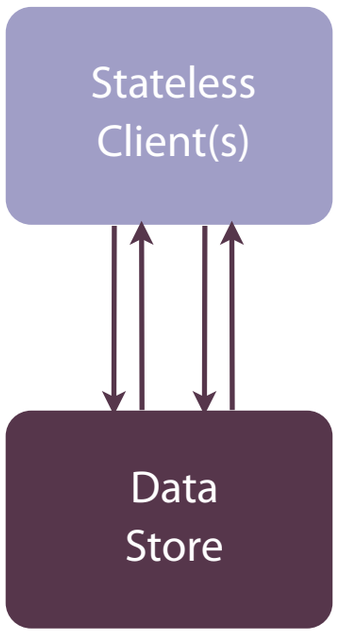
Transactions are often “get” then “put”.

```
em.createQuery("select c ... ");
Customer c = (Customer)q.getSingleResult();

// modify customer

em.persist(c)
```

The Challenge



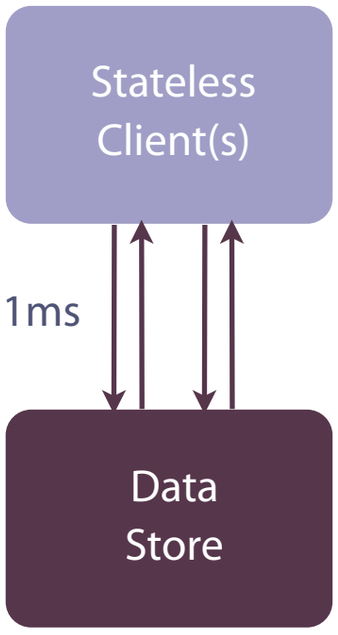
State lives in a data store, not in code.

This paradigm works well for a certain class of problems…

…but it transfers several hard problems to the data tier.

For volatile data, for full-consistency, or for real-time data-intensive analysis, it hits scalability issues.

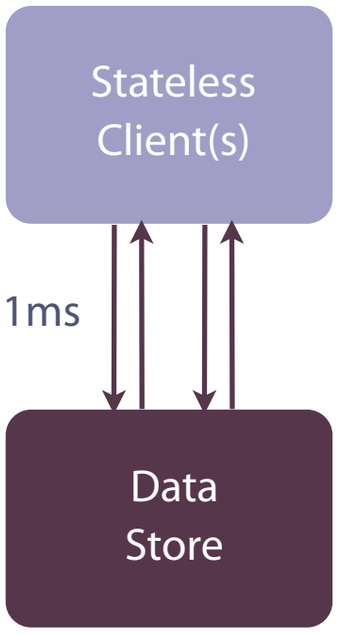
The Challenge



1ms x 4 = 4ms

…that's maybe okay.

The Challenge



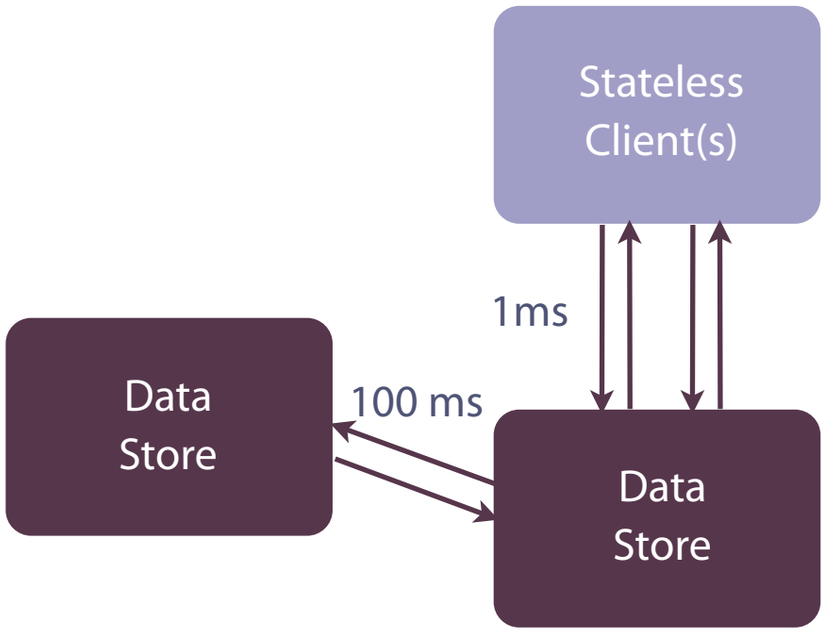
1ms x 4 = 4ms

…that's maybe okay.

**But we max out at 250 txns/sec max,
even less if our computation is expensive,**

and we thrash as we approach that limit!

The Challenge



Wide area, or replicating, we're at ~200 ms per transaction…

…5 txns/sec max…

…still with thrashing and blocking and backlog as we approach that limit.

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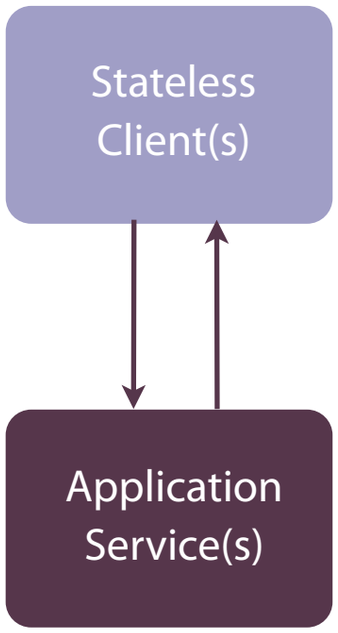
How Monterey Works



Monterey makes stateful processing available to all client instances, implemented as normal code…

…called *segments* or *actors*…

…without the penalties of optimistic locking, and with the added benefits of *application mobility* for *runtime agility.*

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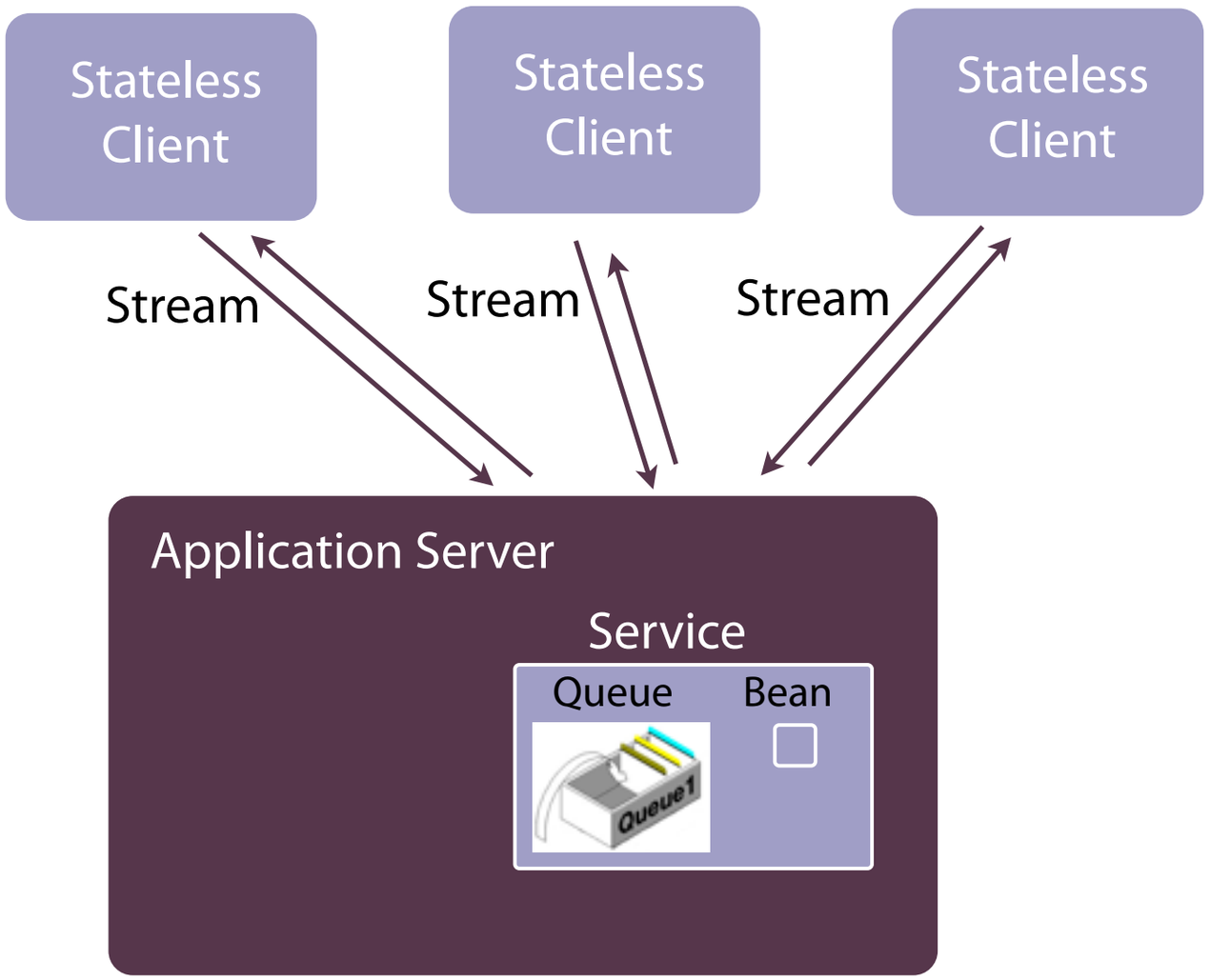
How Monterey Works



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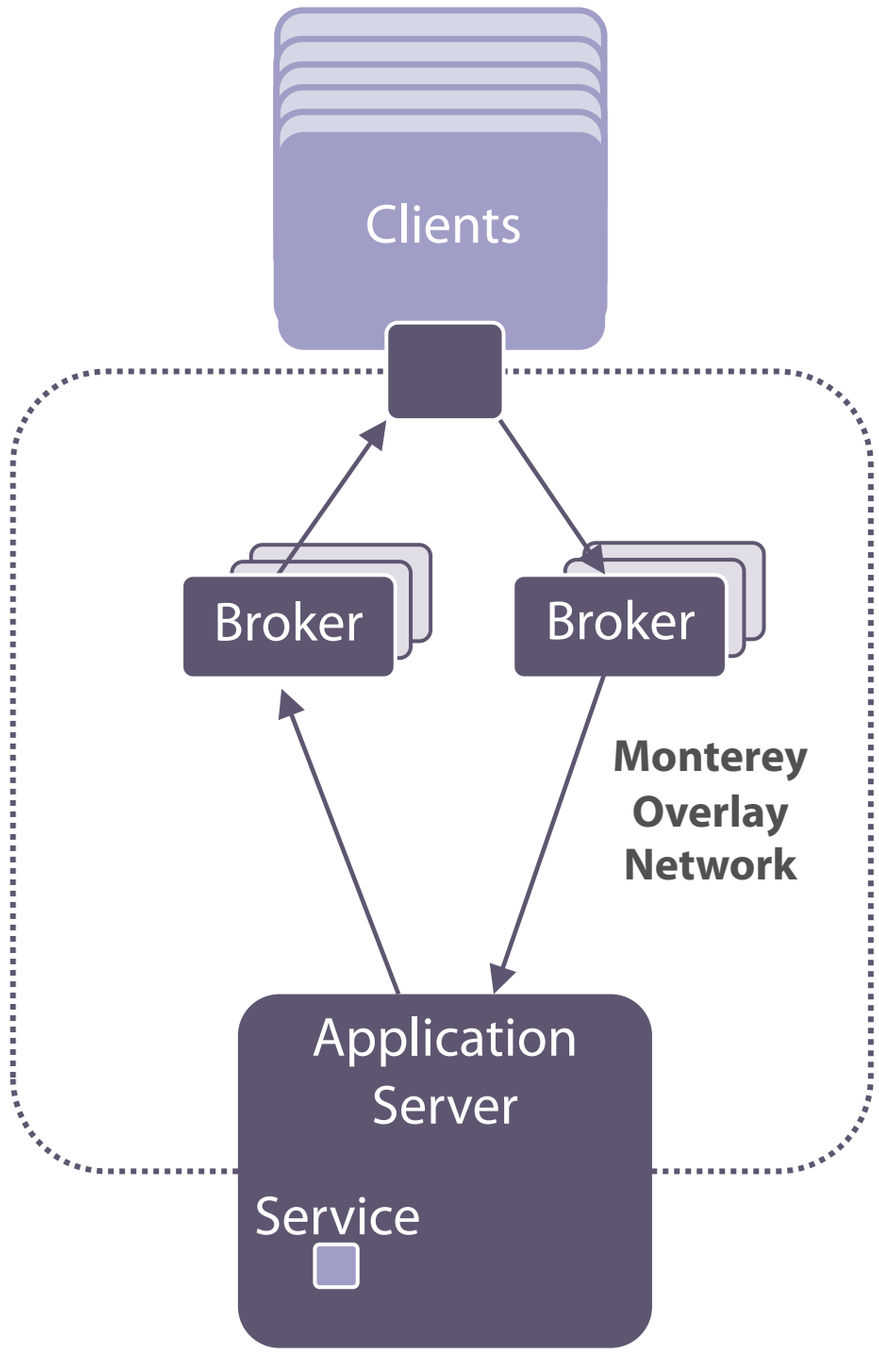
How Monterey Works



- Message brokers route the messages
- Use independent upstream and downstream paths
- Communication is asynchronous: don't block for acks

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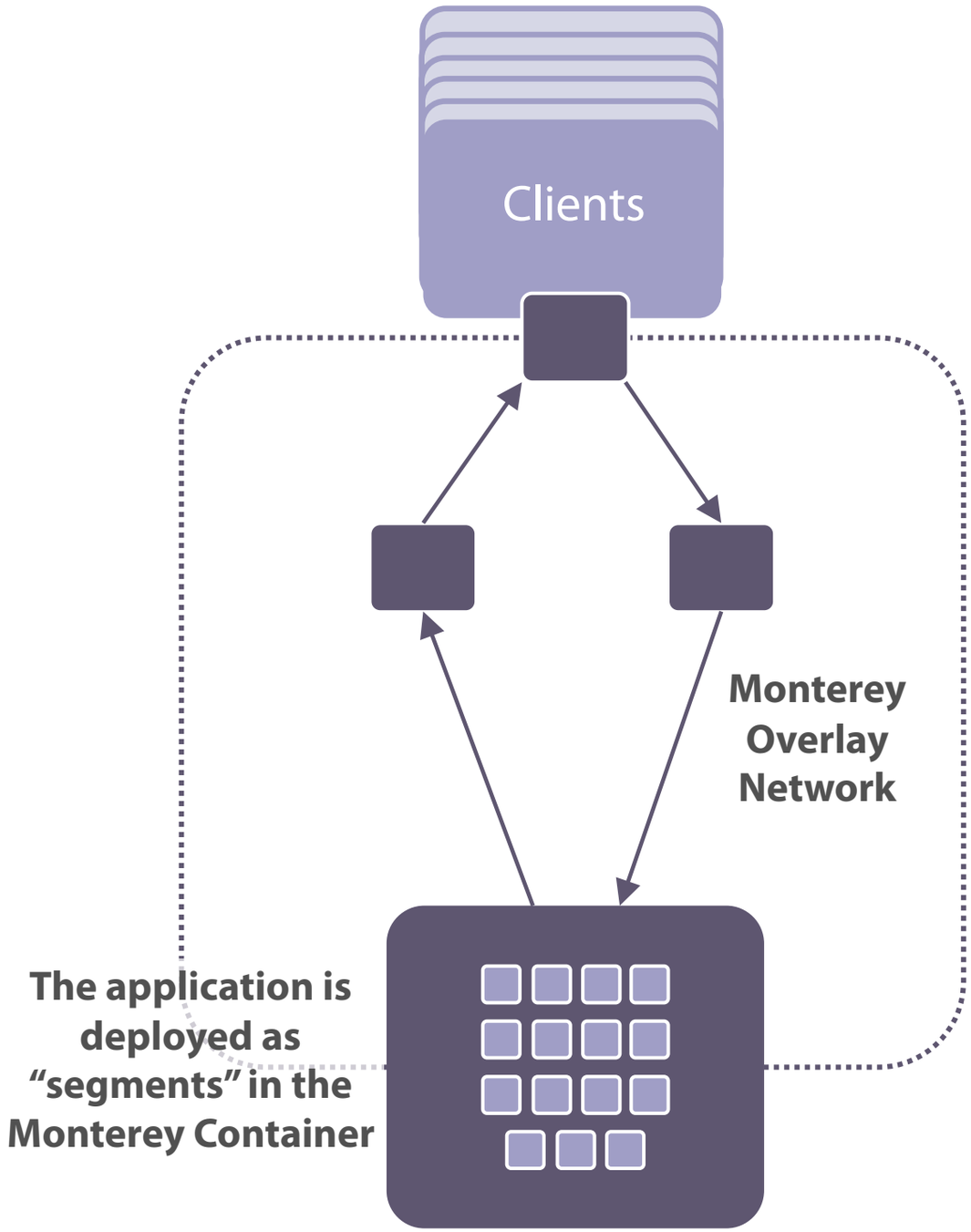
How Monterey Works



- The Service(s) are automatically deployed as very fine-grained components (“segments”) in the Monterey overlay network
- The overlay network transparently manages requests/responses between the Client(s) and segments
- Monterey’s user-defined policies control the running application and dynamically change its deployment as required

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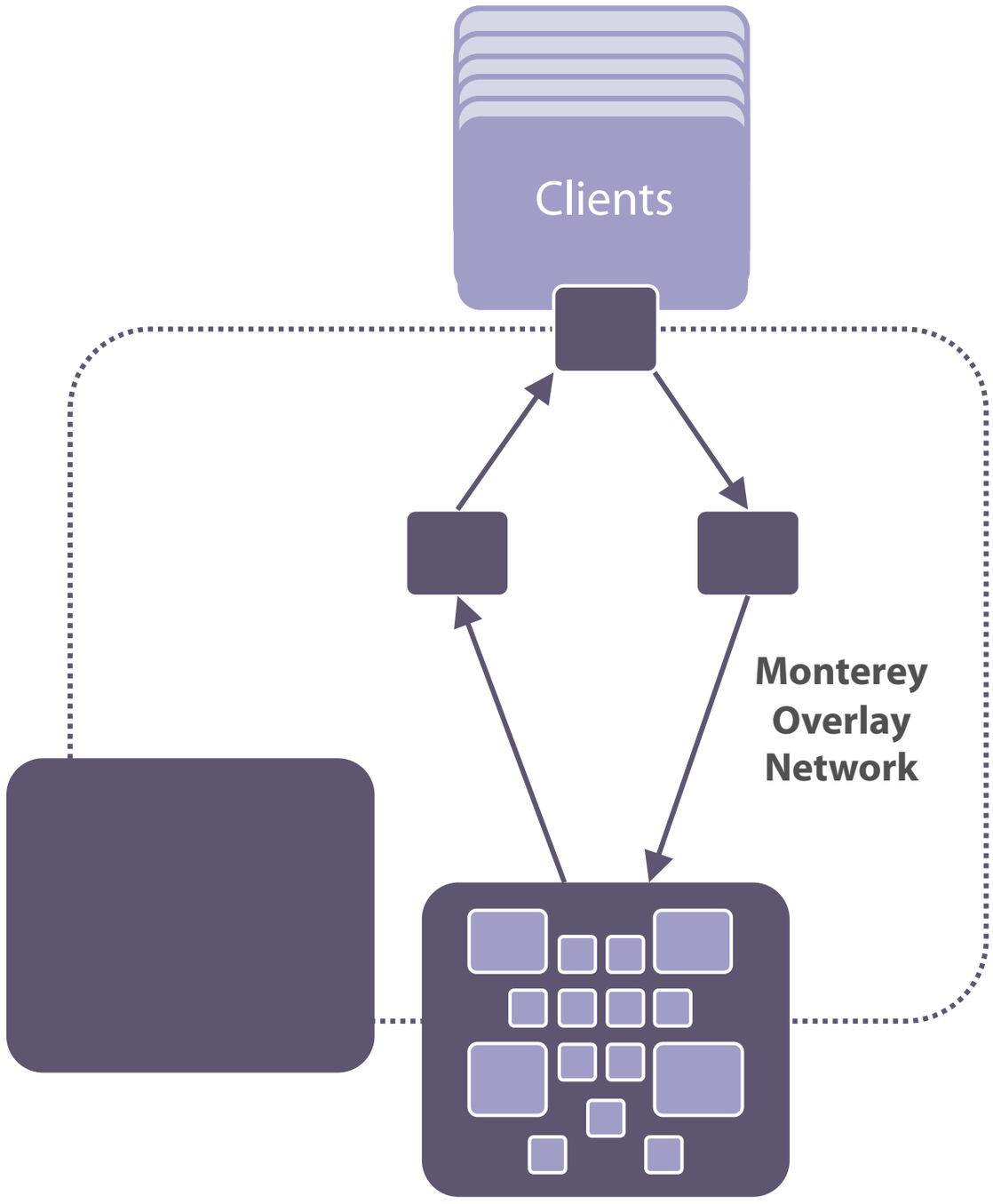
How Monterey Works



- Monterey requests additional resources as necessary (using jclouds to support EC2, cloud.com, vcloud, and many more)
- Decisions are made automatically by Monterey's real-time monitoring working in conjunction with user-defined policies

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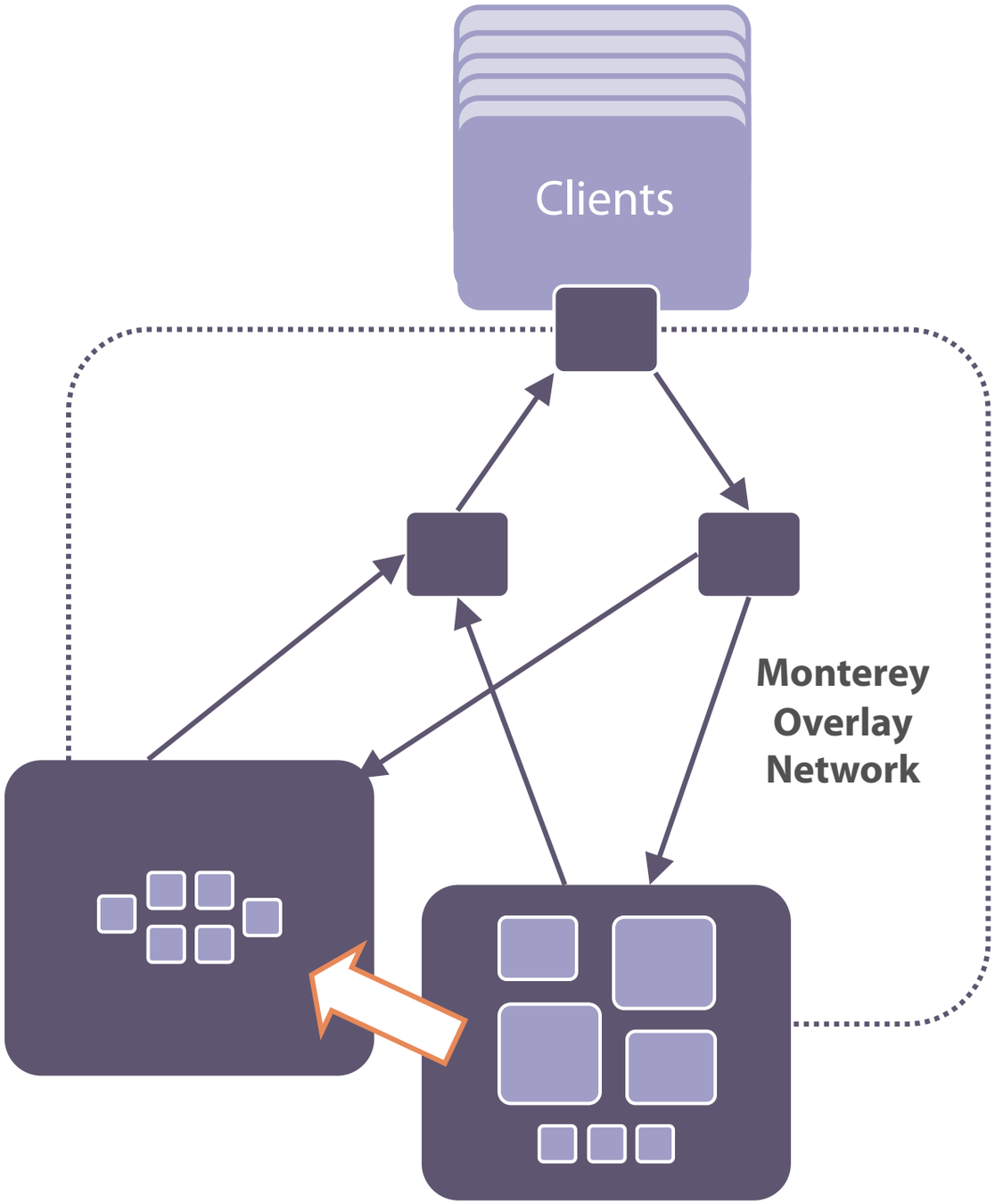
How Monterey Works



- Monterey dynamically re-allocates segments to resources
- Segments move while still running, with zero interruption or degradation to service
- All changes are completely transparent to clients

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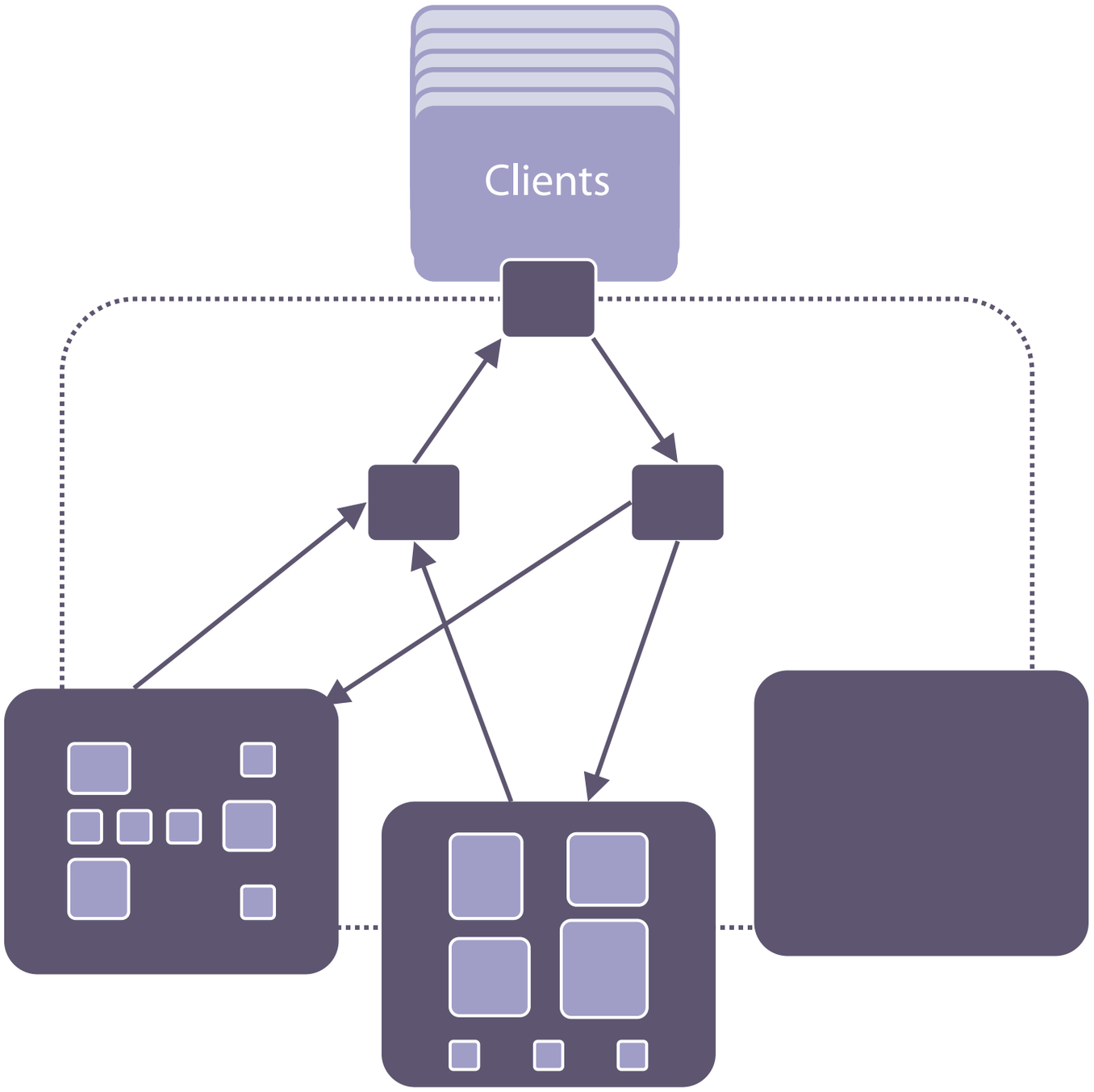
How Monterey Works



- The amount of available resource can be continually adjusted in line with workloads

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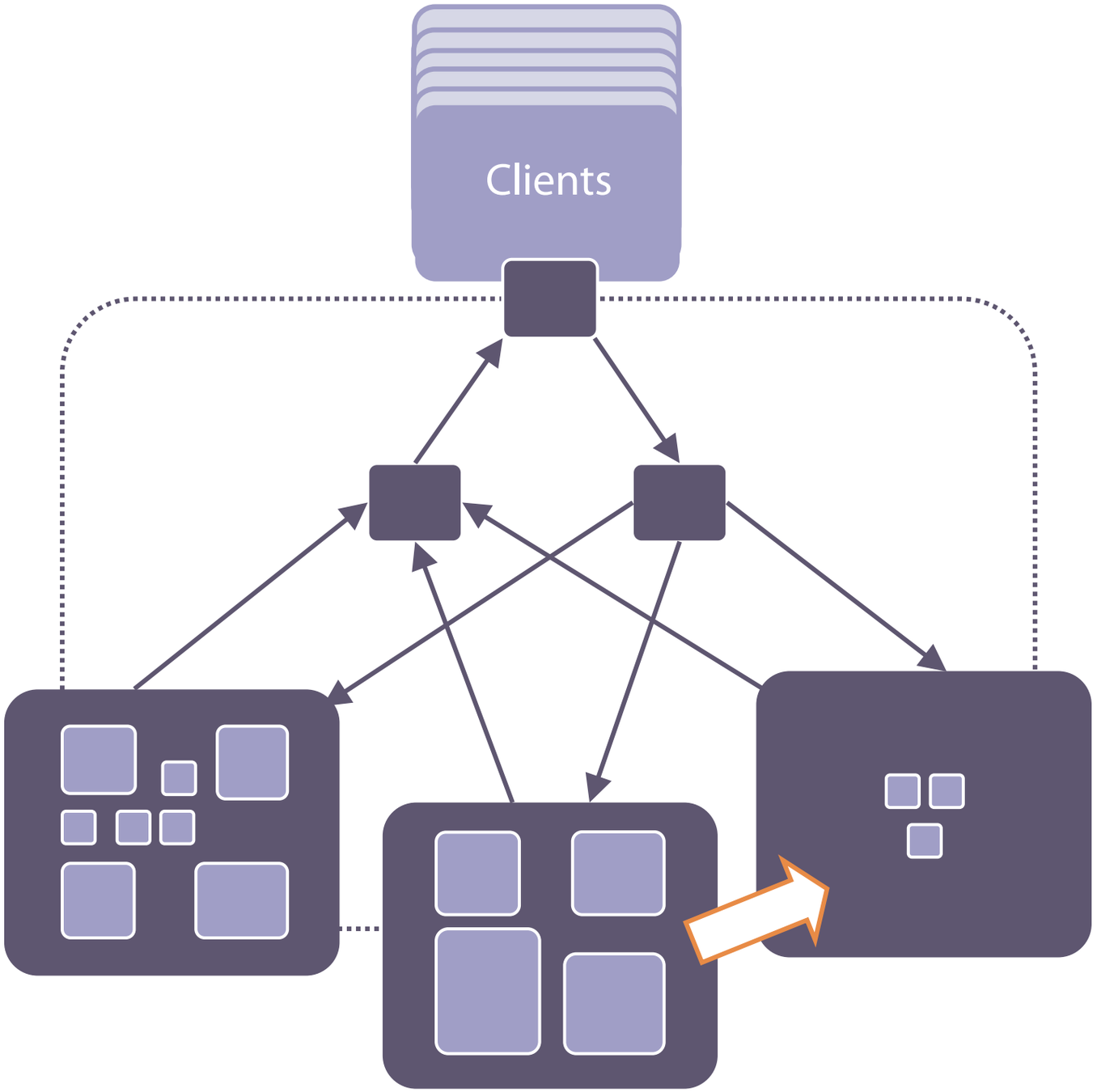
How Monterey Works



- The service can be further scaled-out by re-distributing segments – with no pause in their operation
- At all times transactional integrity is maintained

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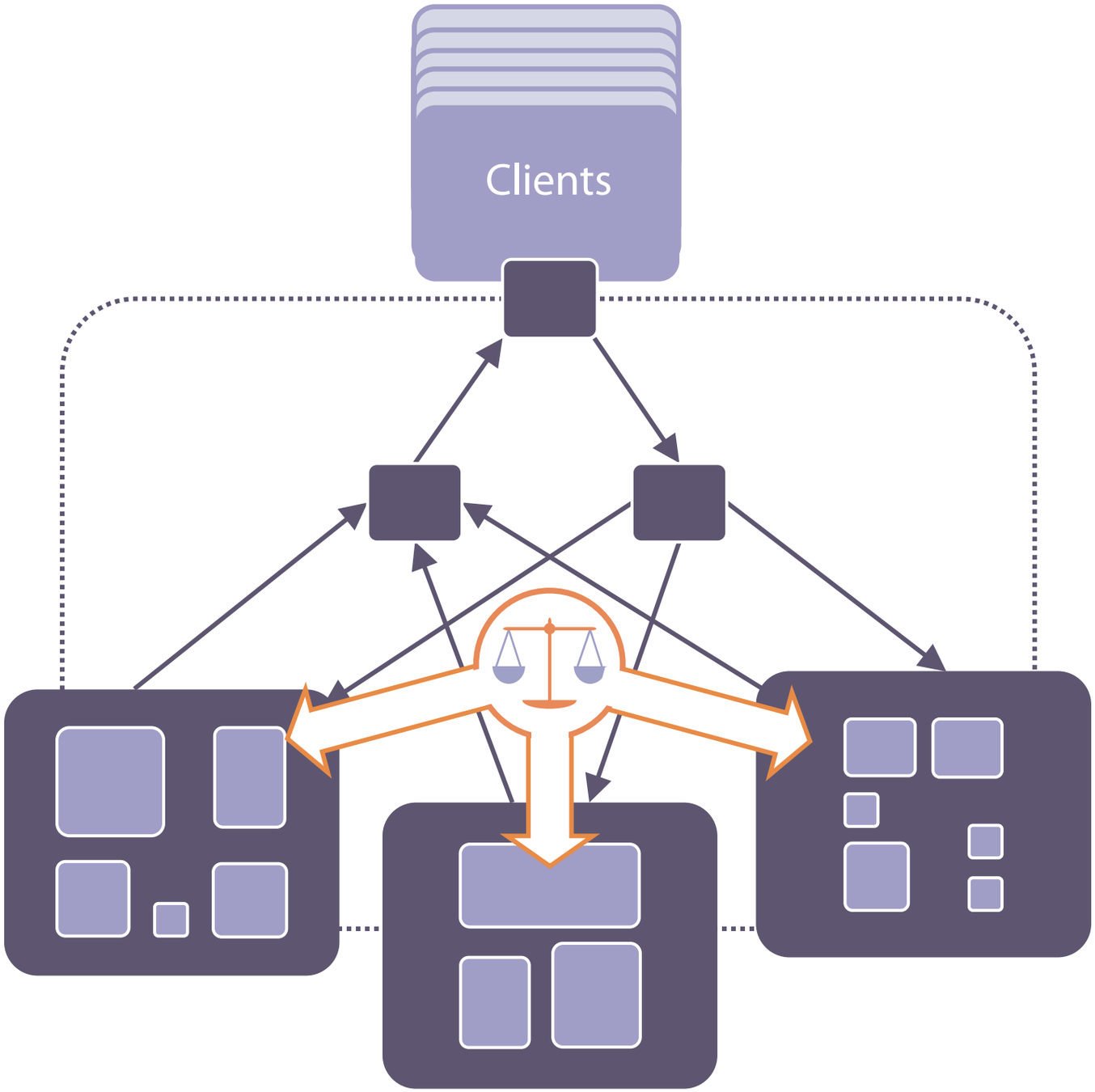
How Monterey Works



- The matching of segment workloads to resources is monitored and managed in real-time
- Dynamic re-configuration and relocation of segments is completed within milliseconds, creating near-instant responsiveness

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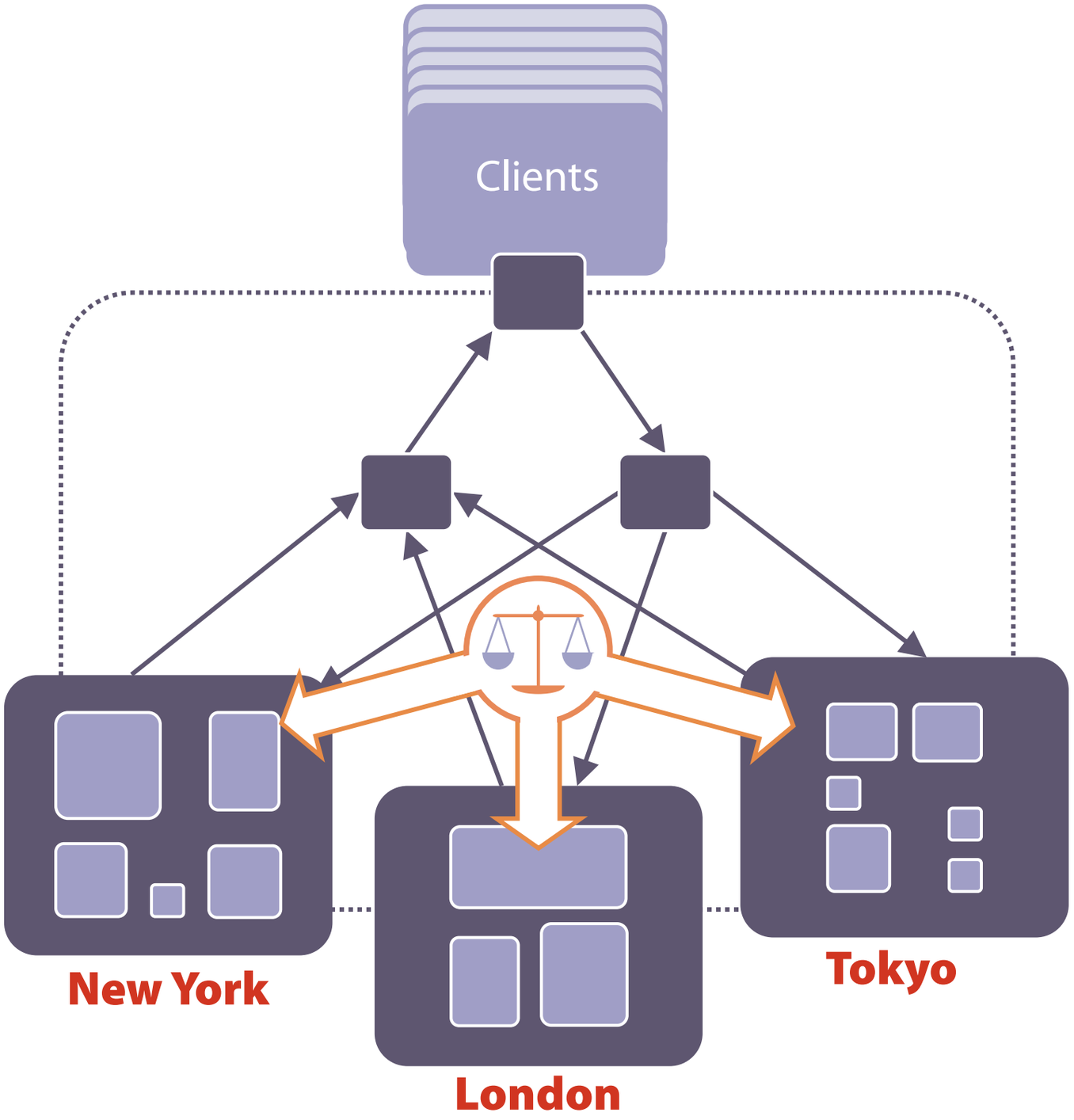
How Monterey Works



- Because components are very fine-grained, they can move quickly and in large numbers across wide-area networks (*e.g.* "follow-the sun" processing)
- Monterey is location-aware, and its policies ensure jurisdictional constraints are always enforced

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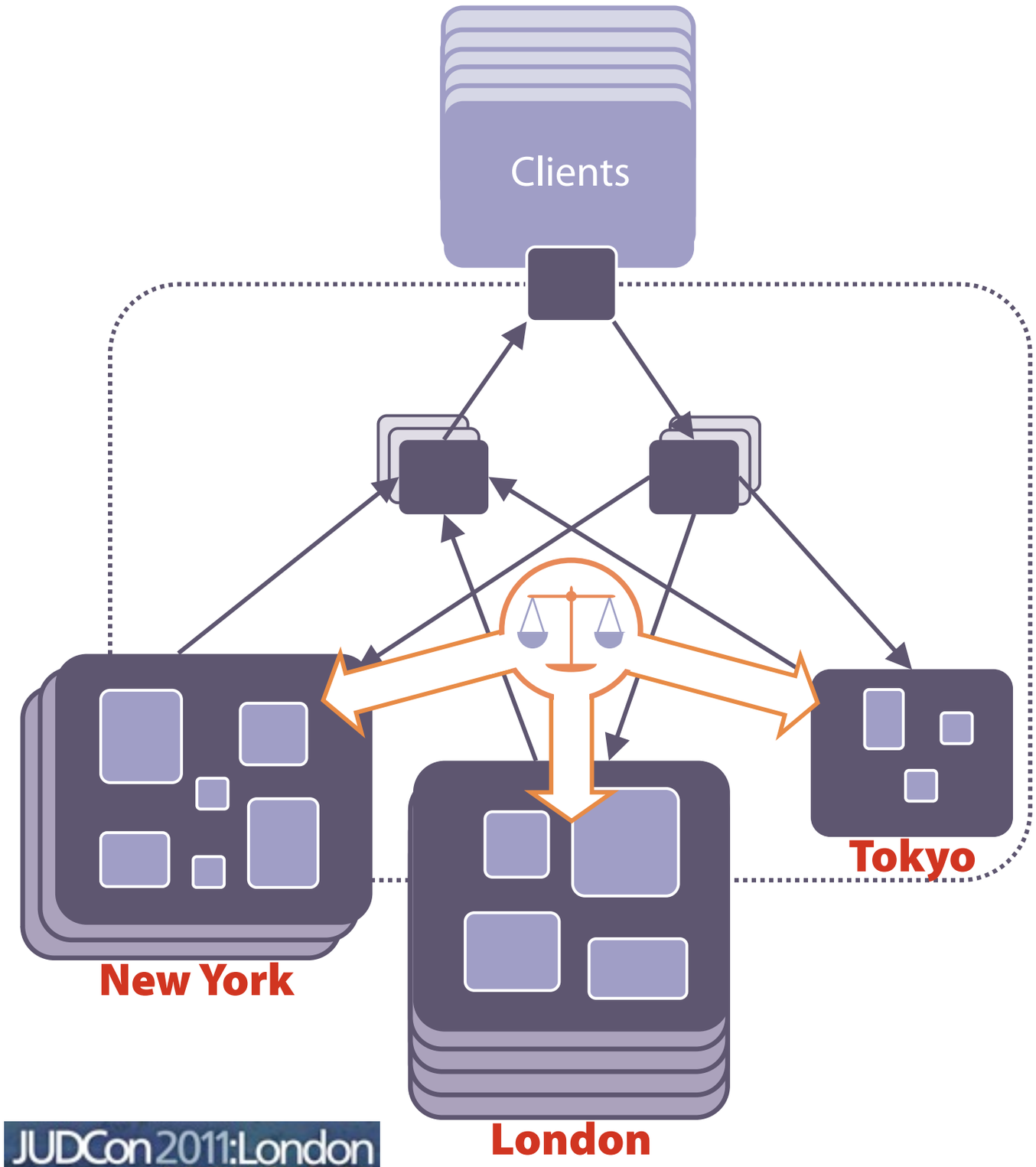
How Monterey Works



- Clients, services, containers, segments, and routing nodes can all scale independently
- Monterey dynamically grows or shrinks resources as required, both within and across data-centres
- Any number of clients and applications can run simultaneously, with policies controlling the entire estate down to a per-segment & per-location level

Application Mobility

If your application can move, you have

elasticity

portability

wide-area

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Application Mobility

Application mobility is the ability
to **dynamically change**
any part of the **infrastructure**
that an application is using
without any disruption of service.

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Intelligent Application Mobility

***Intelligent* application mobility** is
the ability to fully exploit application mobility
by **monitoring demand and performance**
and using **strategic, constraint-based policies**
to drive an **intelligent** set of **responses**

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CDI + Monterey

- **Monterey hosts your POJO stateful business logic**
- **Monterey-Seam uses CDI injections to supply interfaces to these remote Monterey actors (application segments) in your CDI beans in AS7**
- **Callers don't care where in the world processing is happening; they just write their code as normal!**

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CDI + Monterey

- **Monterey hosts your POJO stateful business logic**
- **Monterey-Seam uses CDI injections to supply interfaces to these remote Monterey actors (application segments) in your CDI beans in AS7**
- **Callers don't care where in the world processing is happening; they just write their code as normal!**

  - Monterey transparently routes the calls to correct locations
  - Even as these **stateful beans move**
  - With many options for **resilience and persistence**
  - Using **jclouds** to access many hosting providers
  - Optimizing for **latency** or **cost** or **jurisdiction**

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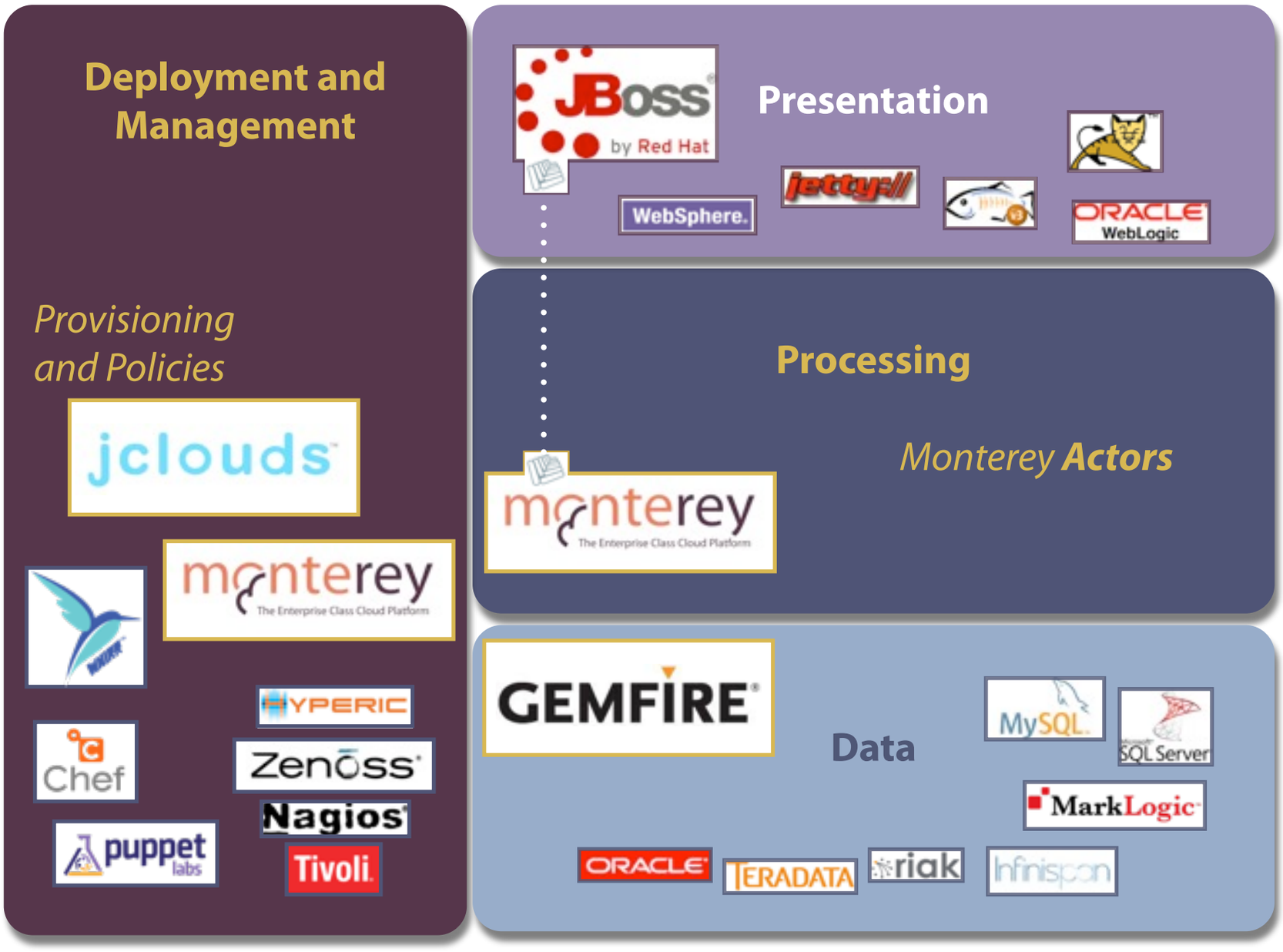
Software Overview



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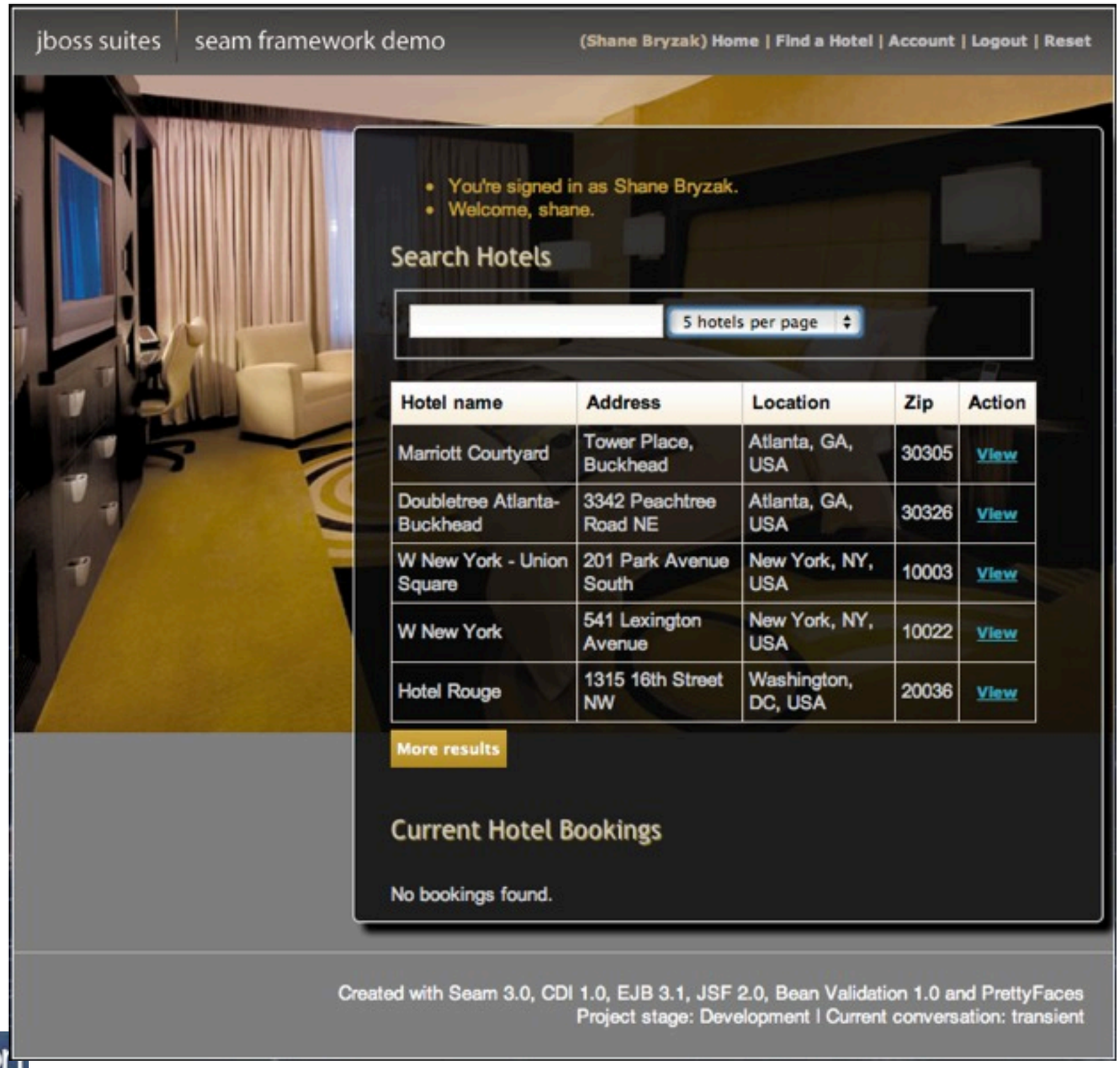
Seam Booking



Thank-you ,

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- {**alex,aled**}@cloudsoftcorp.com

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Wishlist for an Elastic App Tier

- **Design & Build**
  - Think in terms of **fine-grained components**
  - Provide a **domain specific API**
  - **Critical data** should live in-process
  - Test locally and at scale
  - Use **dependency injection**
- **Deploy & Run**
  - **Drag-and-drop** my app to a **simulator**, or a **cloud**, or an **in-house environment**
  - **Location awareness** to guarantee compliance
  - The ability to specify the **operational policies** that matter to me—**resilience**, **performance**, **cost**
- **Monitor & Manage**
  - **Insight** into **what each segment is doing**
  - **Visibility** as to **where each segment is running**
  - **Real-time policies** that **optimize** execution