Inprise Application Server 4

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Agenda

- IAS 4 and the J2EE Vision
- EJB Overview/Refresher
- The IAS 4 EJB Container

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Java 2 Standard Edition

- "Write Once, Run Anywhere" portability
- JDBC API for database access
- CORBA technology for interaction with existing enterprise resources and other programming languages
- Security model that protects data even in internet applications

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Java 2 Enterprise Edition (J2EE)

- Full support for Enterprise JavaBeans 1.1 components
- RMI/IIOP
- Java Servlets API
- JavaServer Pages technology
- JTS
- JNDI

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Inprise Application Server
Implements the J2EE Vision

- Based on EJB 1.1
  - For easily building server side components
  - Based on CORBA for scalability and reliability
- Complete Web Engine (Servlets, JSP)
- Naming Service
- Java Transaction Service (JTS)
- Security Service

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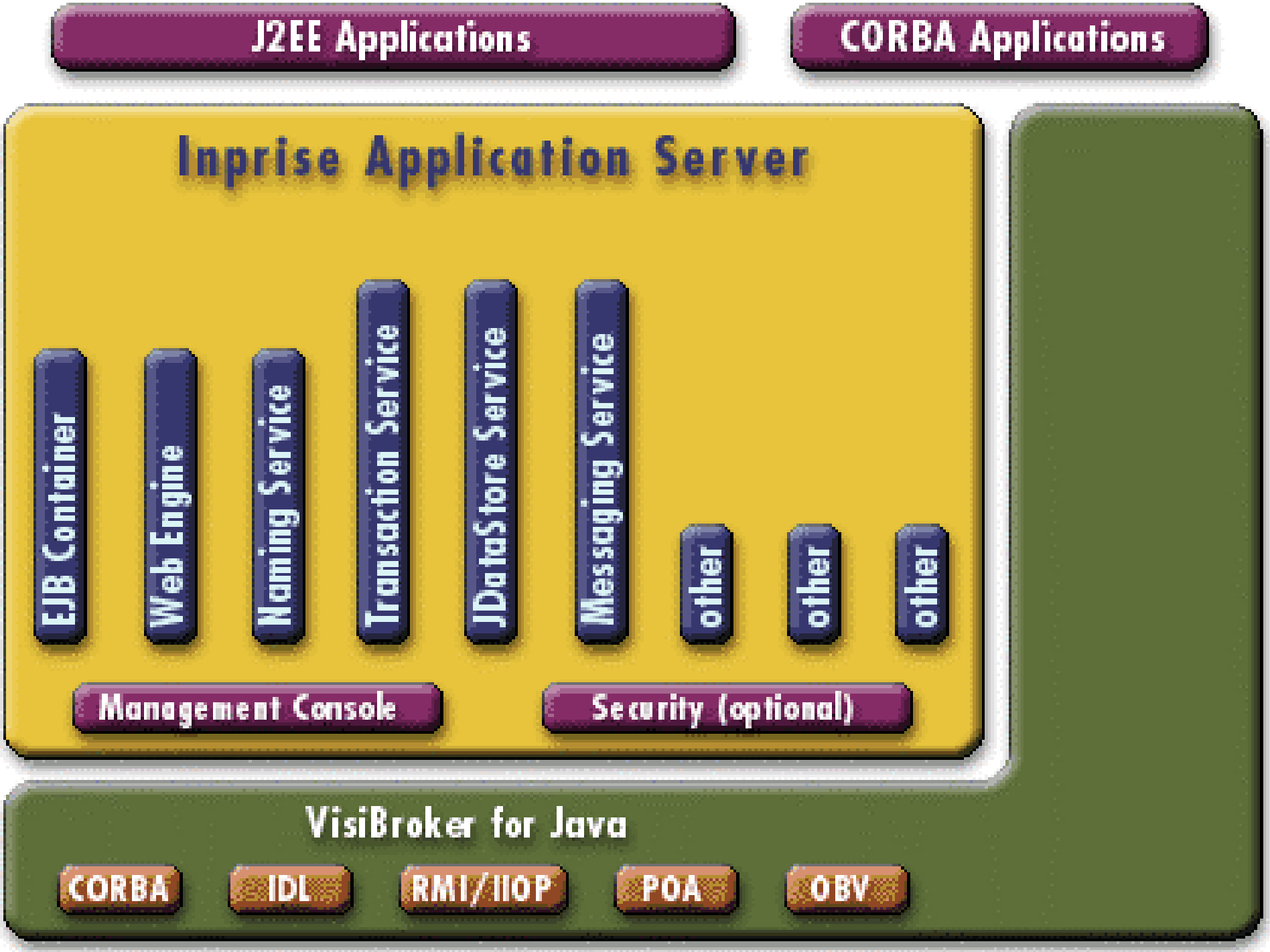
J2EE Applications
CORBA Applications
Inprise Application Server
EJB Container
Web Engine
Naming Service
Transaction Service
JDataStore Service
Messaging Service
other
other
other
Management Console
Security (optional)
VisiBroker for Java
CORBA
IDL
RMI/IIOP
POA
OBV

Enterprise Java Bean Overview/Refresher

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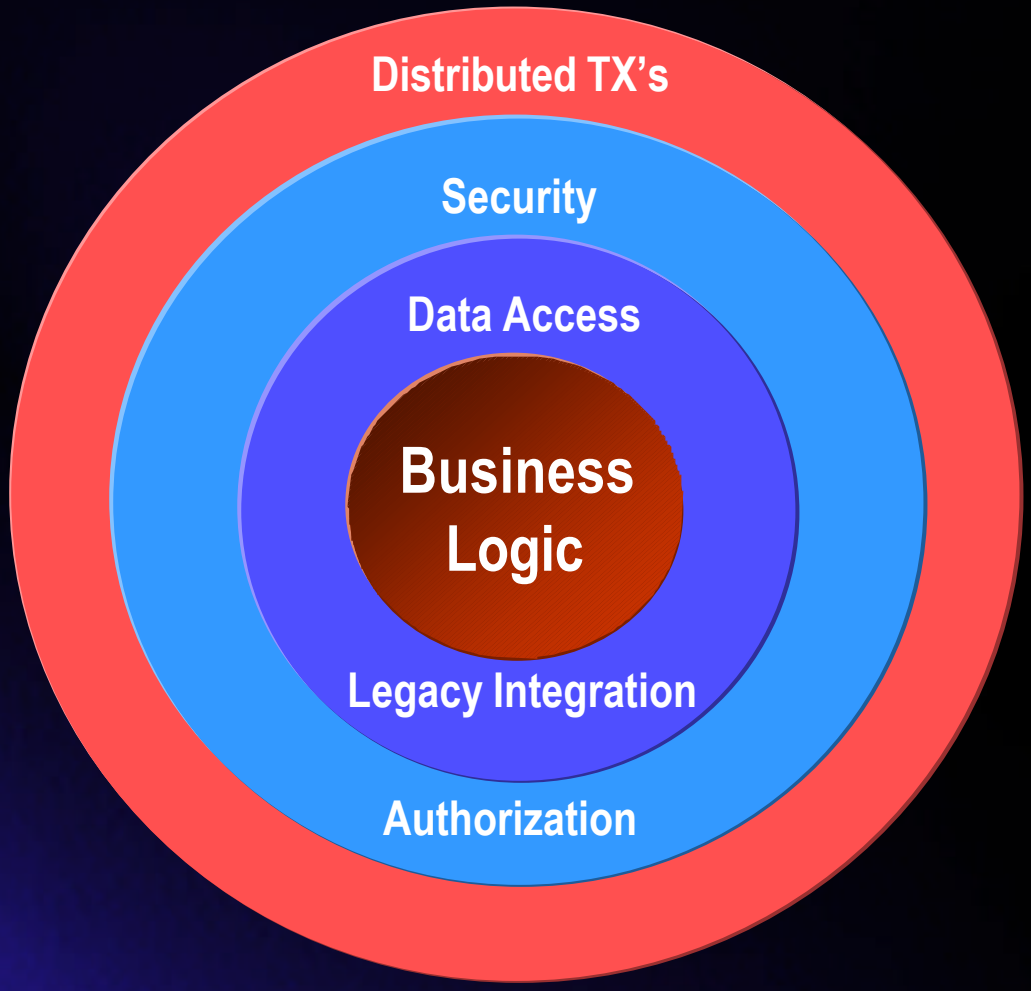
Developing a Distributed Object



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EJB Acknowledges Roles

Bean Provider

Logic Developer

No Transaction Code
No Concurrency Code
No Security Code
No Distribution of Beans

Assembler

Composes Applications

Generally Understands Logic
Expert at Apps, Applets Servlets etc..
Usually builds GUIs

Deployer

Deployment to Operational Environment

Defines Security Roles
Defines Transactions
A Systems Expert

Sys Admin

System Manager(s)

Keep Systems Operational
Often good card players

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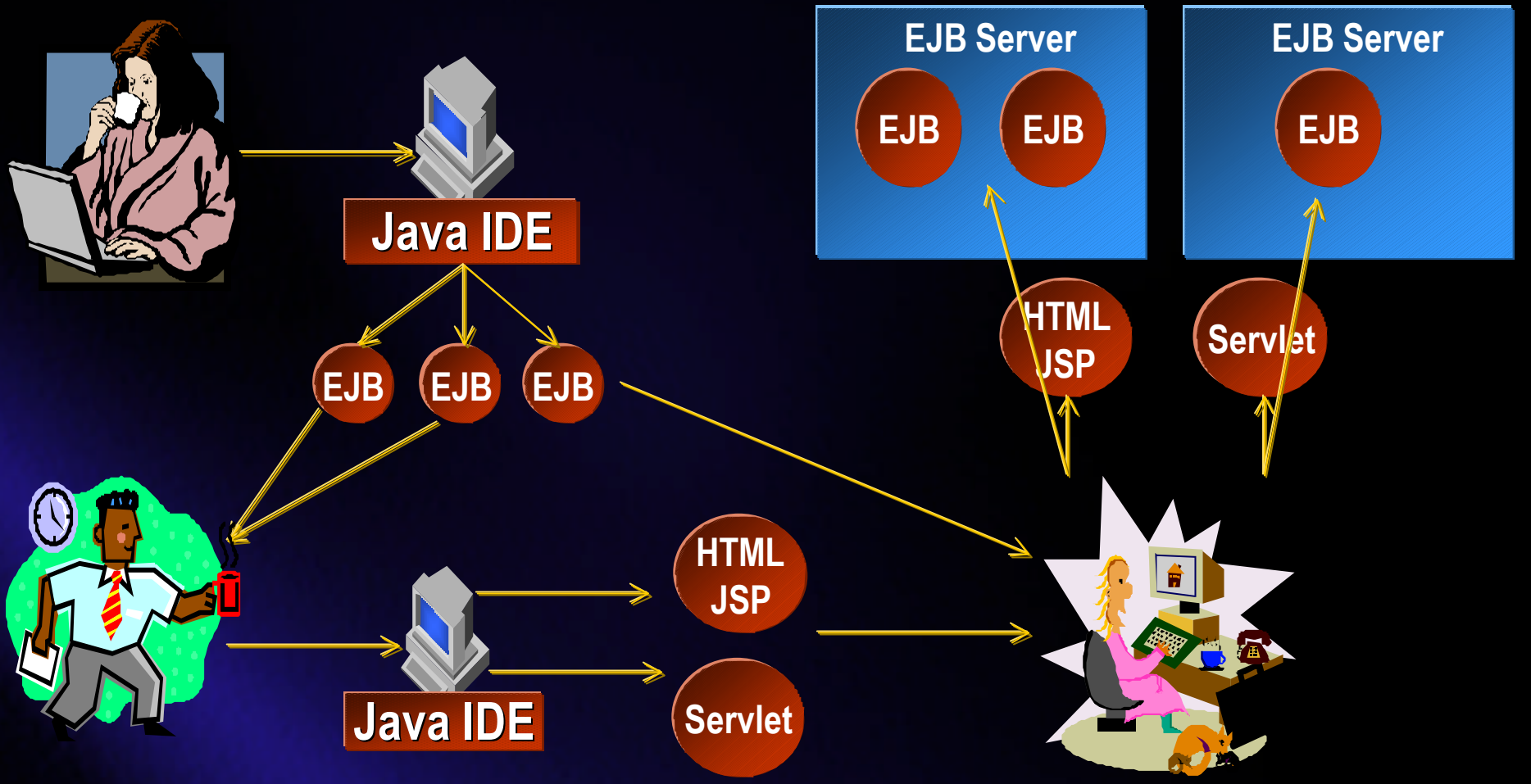
The EJB Development Flow



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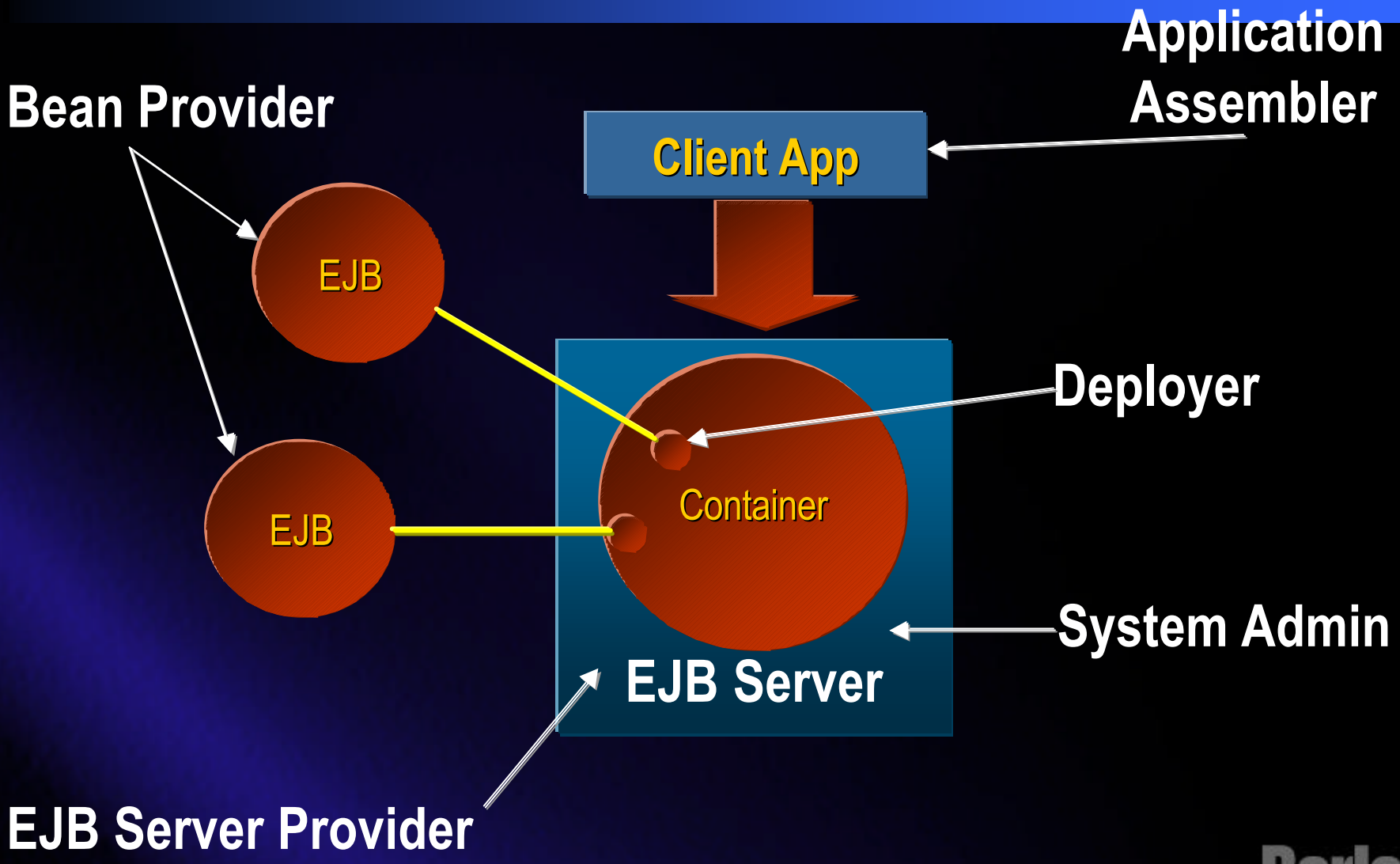
EJB Architecture & Roles



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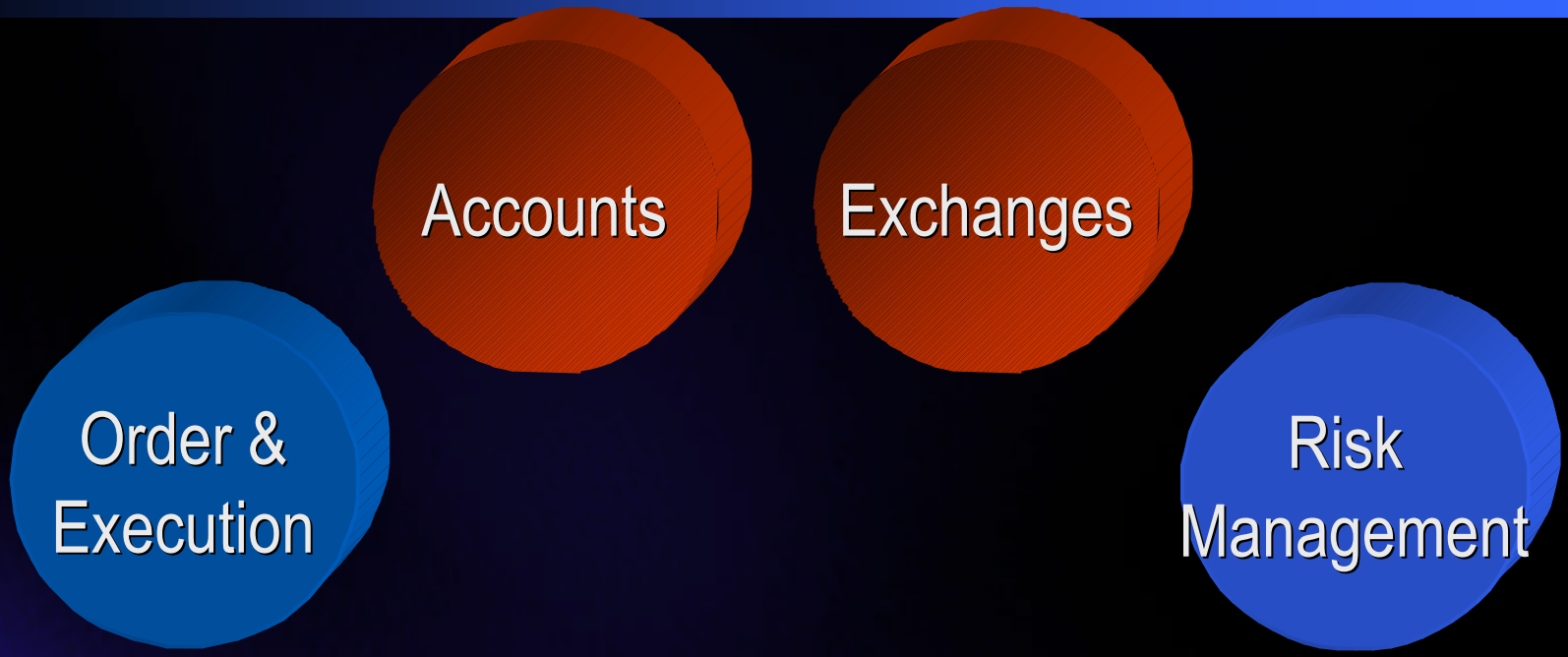
EJB's are Course Grained



Purchased

Custom Built

Fine Grained Objects should not be modeled as EJB's

(Invoice line-items, customer mailing addresses)

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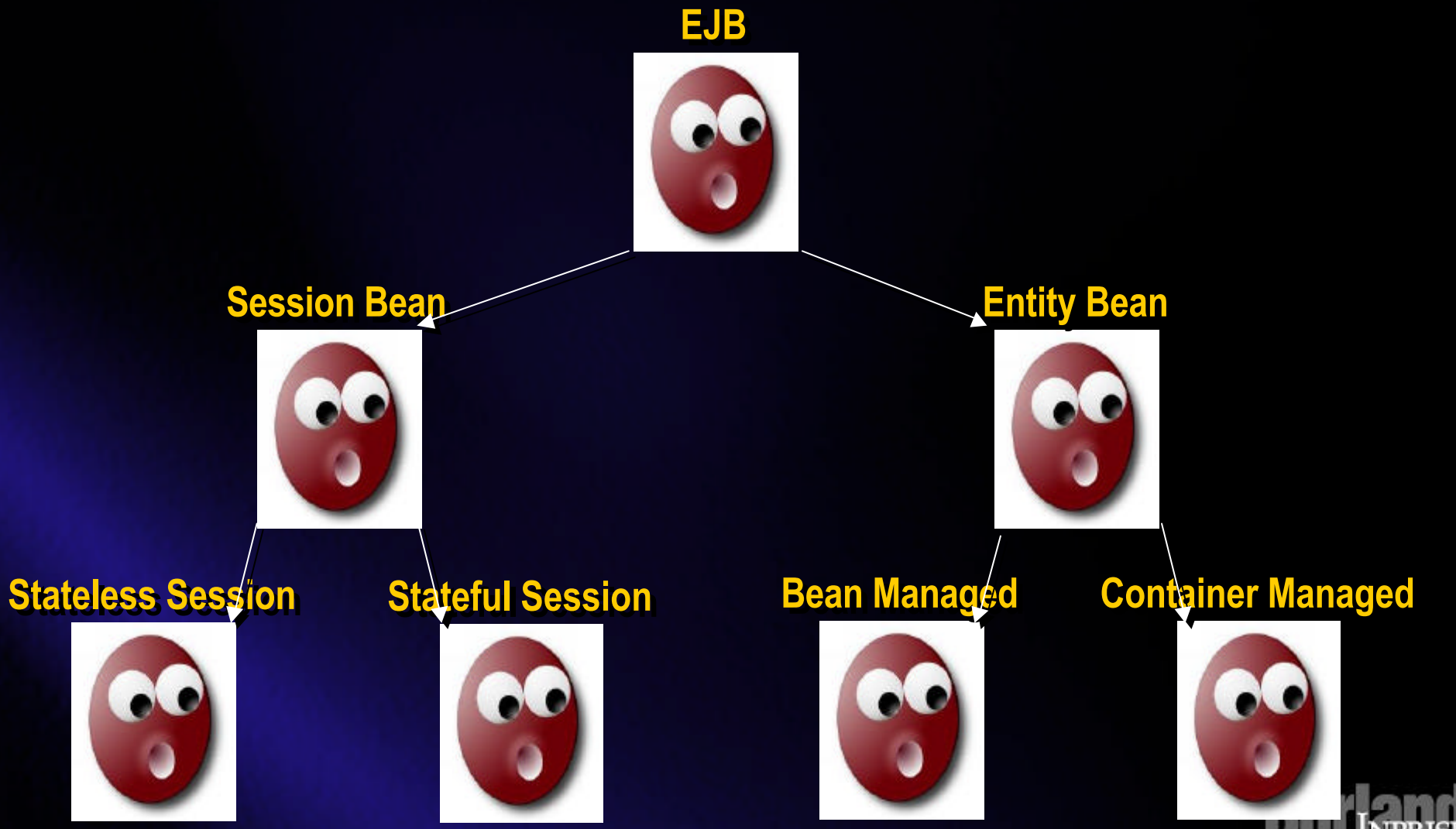
Enterprise Bean Patterns



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EJB Deployment Descriptor

- Allows declaration of transaction and security attributes
- Allows you to declare Data Access attributes
- Allows you to declare EJB reference attributes
- An EJB Deployment Descriptor describes the classes, interfaces and declarative behavior of an EJB

NO PROGRAMMING REQUIRED!

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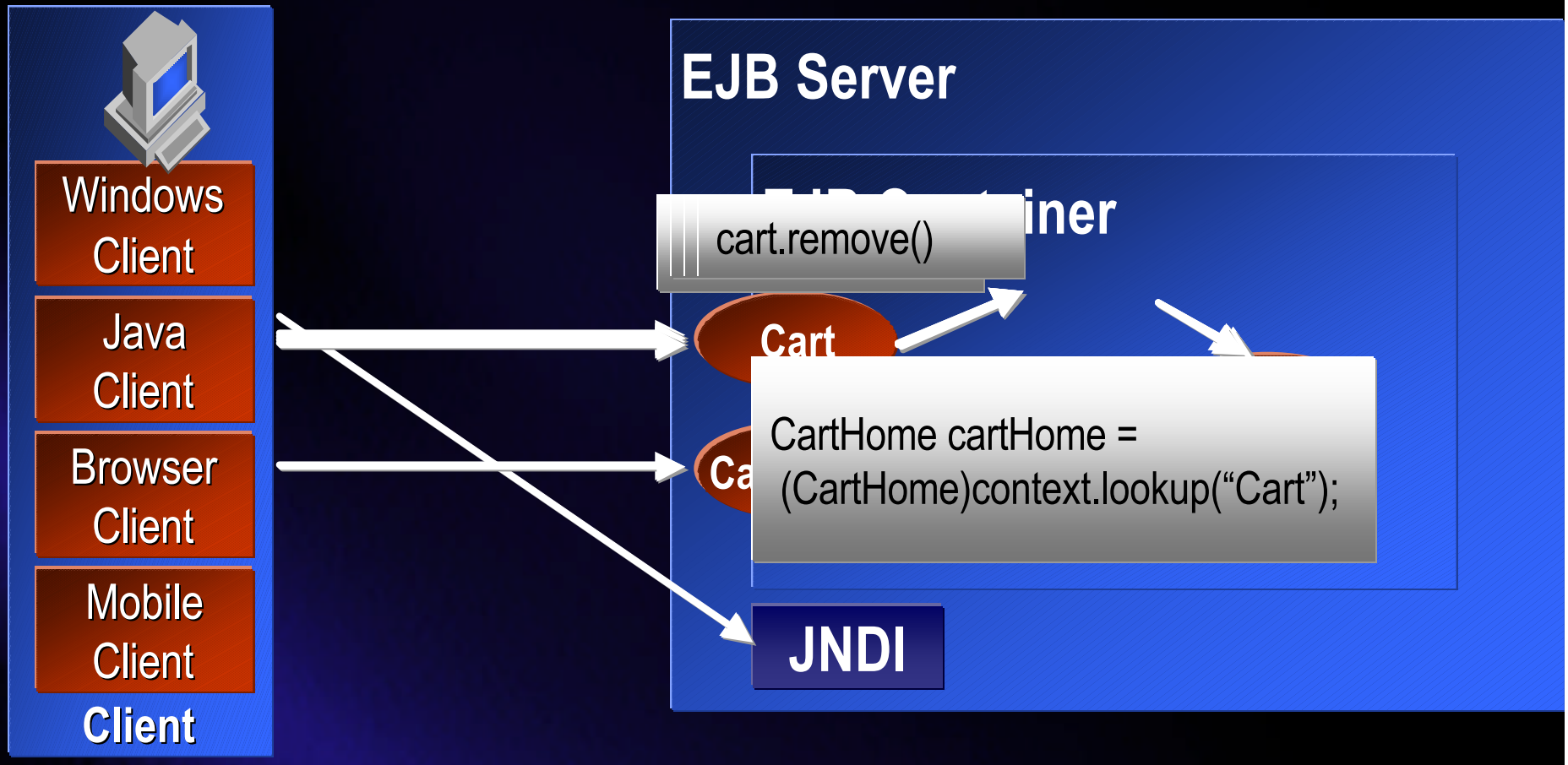
Clients View of Session Bean



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The IAS 4 EJB Container

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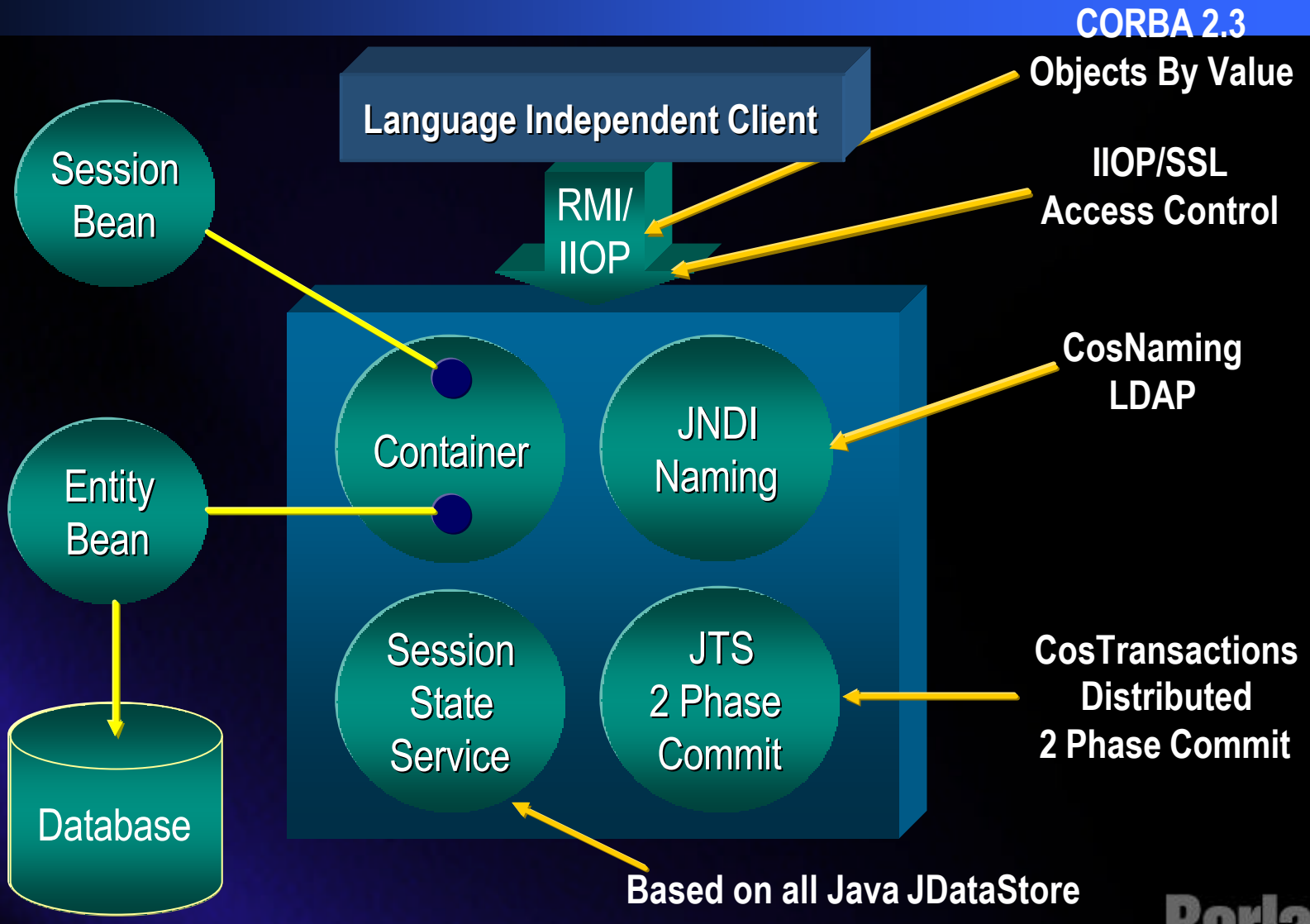
Inprise EJB Architecture



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Key EJB Requirements

- EJB 1.1 Compliance
- Support for CORBA
- Transactions
- Clustering
- Security
- Data Access
- Management

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EJB 1.1 Compliance

- Security Model Overhauled
- EJB Roles Clarified
  - New Deployment Descriptor Structure
  - XML with standard specified DTD
  - Vendor Specific Deployment Descriptor
- EJB Reference Used for Related Beans
- JDBC 2.0 DataSources Used

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IAS 4 Implementation

- Complete EJB 1.1 Support
  - EJB Security Model
  - XML Deployment Descriptors
  - JDBC 2.0
  - Generic Resource Naming
  - EJB 1.0 -> 1.1 Conversion Utility
  - EJB 1.1 Development Support in JBuilder
  - EJB 1.1 Management Support with AppCenter

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CORBA Support

- Optional RMI/IIOP mapping defined to ensure interoperability between EJB environments
- Standard Security and Transaction Propagation
- EJB access from non-Java clients
- Use of CORBA services with EJB's
- Requirement for J2EE compliance

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IAS 4 Implementation

- Built from the bottom up with CORBA
- Every EJB is simultaneously a CORBA Object
- JNDI is built over CORBA Naming Service
- JTS Implemented with ITS
- Interoperable with other standards based Application Servers

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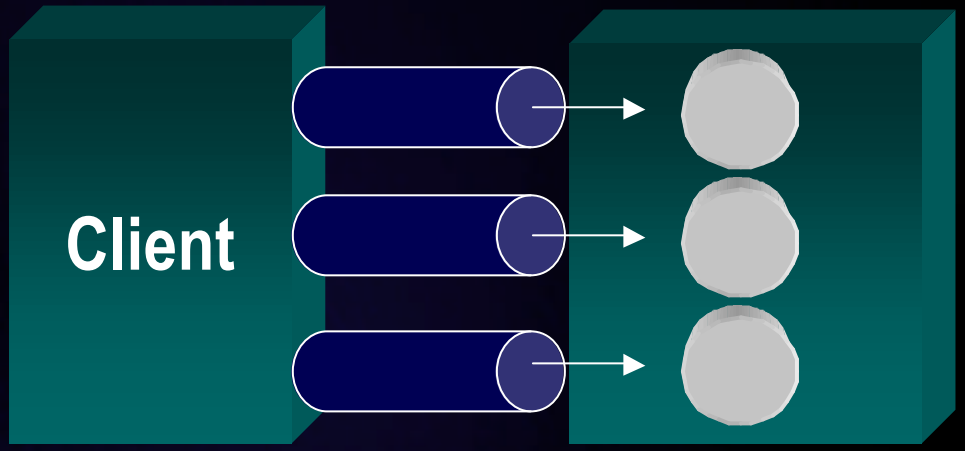
TCP Connection Management



Extremely Expensive Use of Resources!
Many RMI implementations do this!!!

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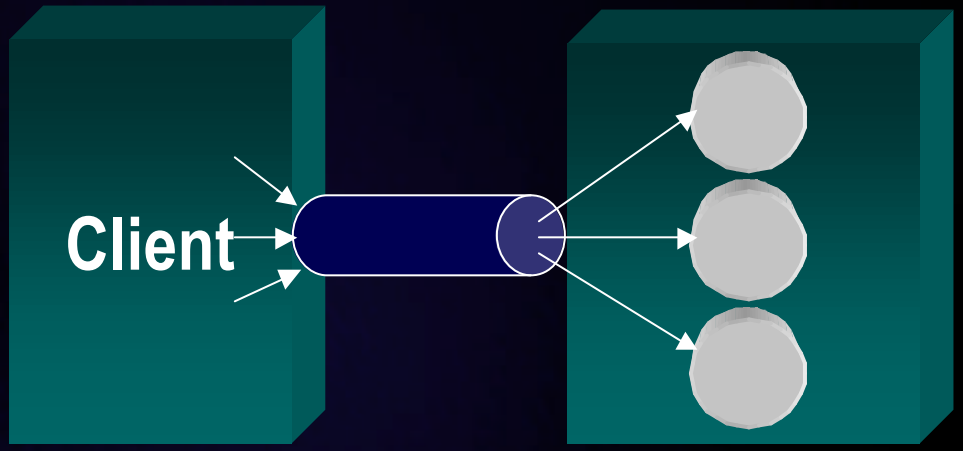
VisiBroker Connection Management



Sophisticated Multiplexing and locking for Outstanding Scalability and Dead-Lock Avoidance

Scalability and Performance: Database Connection Pooling

- Funnels database requests through pool of connections
- Connections can be reused

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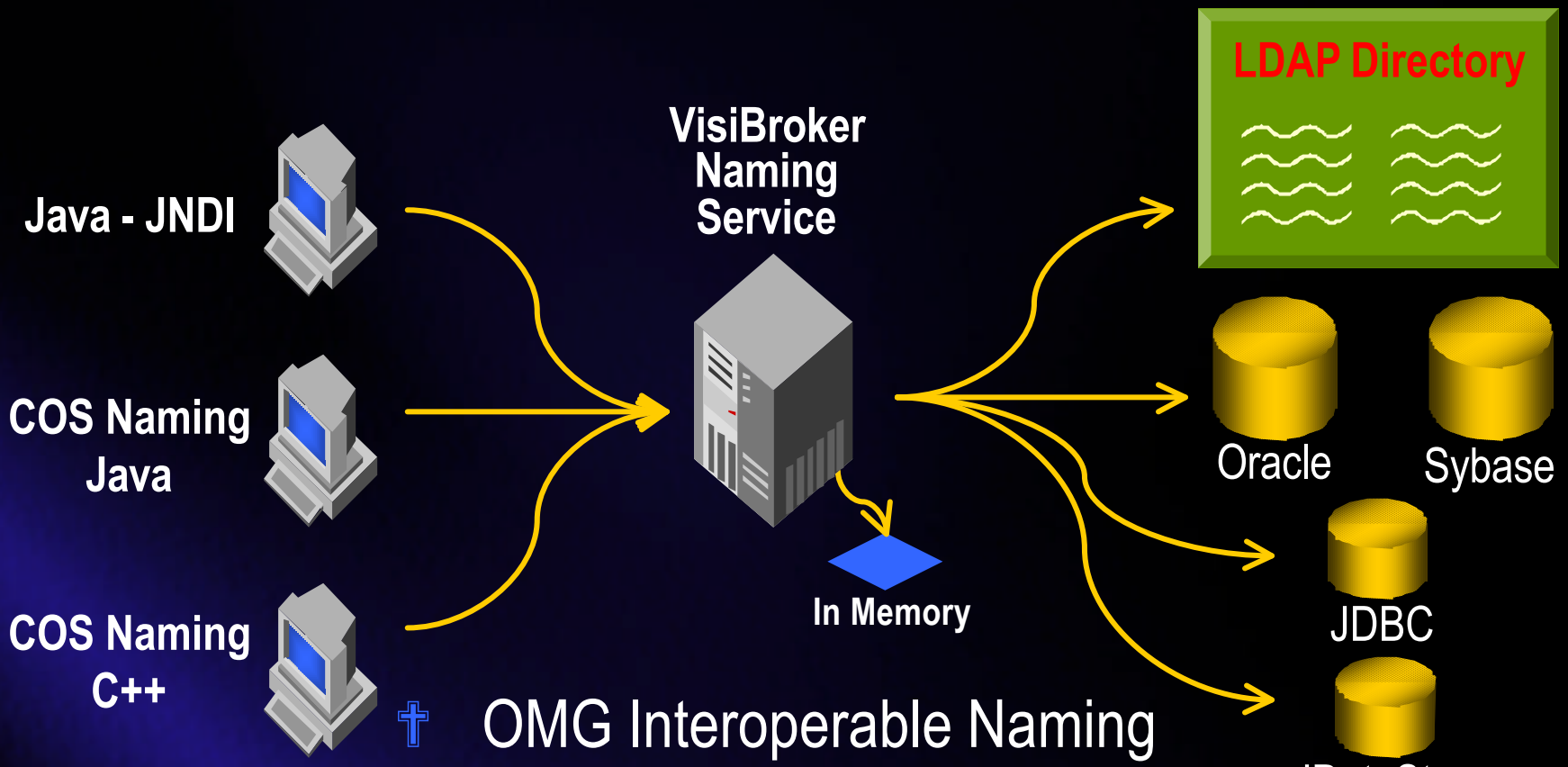
Naming Service - Support for Standards



- OMG Interoperable Naming
- LDAP, JDBC storage options
- COS Naming, JNDI client access

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Transaction Support

- JTA UserTransaction Interfaces
- JTS
  - "JTS provides transaction interoperability using the standard IIOP protocol for transaction propagation between servers"

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EJB Transaction Support

- EJB allows you to either declare transactions or code them explicitly.
  - **Container Managed**
    - Allows the assembler to declare transaction support in the Deployment Descriptor
    - Transaction attributes specified at the bean and method level
  - **Bean Managed**
    - An EJB Container is required to implement `javax.transaction.UserTransaction`
    - Provides an interface to a transaction service

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EJB Container Transactions

```
<container-transaction>
  <method>
    <ejb-name>SimpleStatefulBean</ejb-name>
    <method-name>*</method-name>
  </method>
  <trans-attribute>TX_SUPPORTS</trans-attribute>
</container-transaction>
```

CartBean

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IAS 4 Implementation

- Full Support for JTS with ITS
  - Embeds TX context in IIOP packet per specification
  - Allows Interoperable CORBA/EJB transactions
  - Interoperable AppServer transactions
- Complete Java distributed transaction manager
- Parallel Transactional Access to Entities

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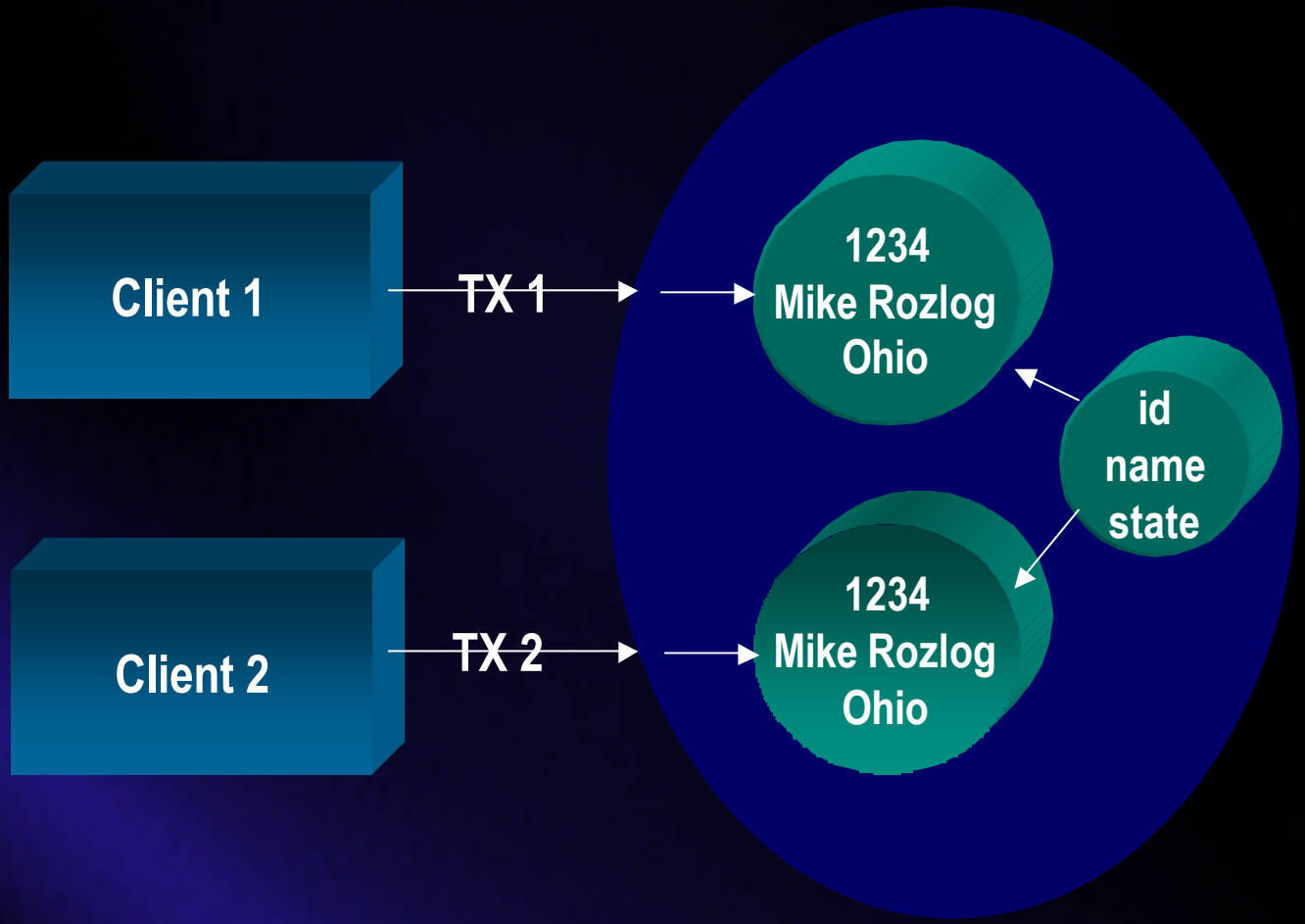
Parallel Transactions



Clustering Support

- Ability to perform Dynamic Load Balancing
- Fail-Over Capabilities
- Redundant Naming

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IAS 4 Implementation

- Supports Heterogeneous Clustering
  - Any number of EJB's on any number of servers
- Automatic Load Balancing
- Complete Fail-Over Capabilities
  - Includes Redundant Stateful Session Beans

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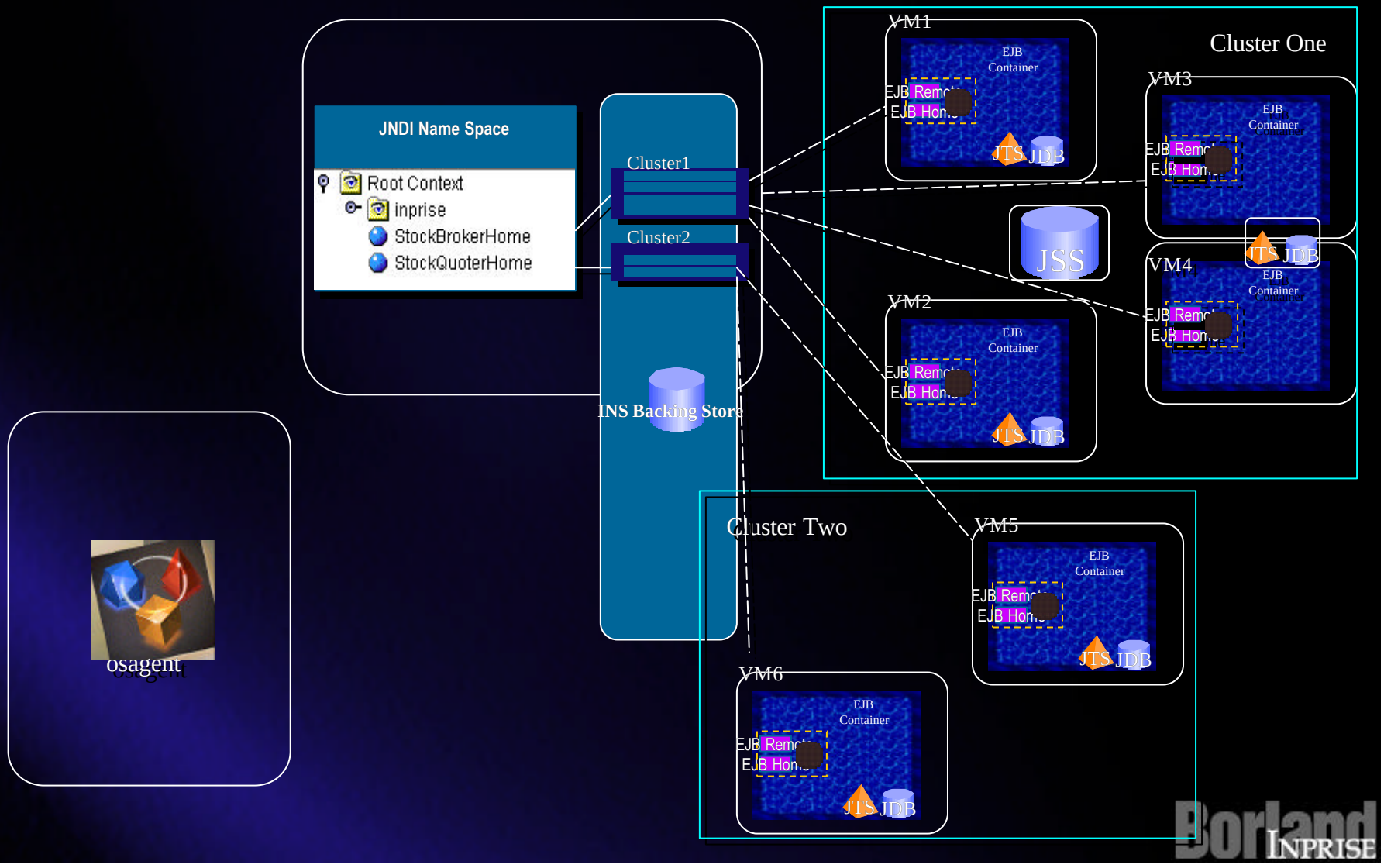
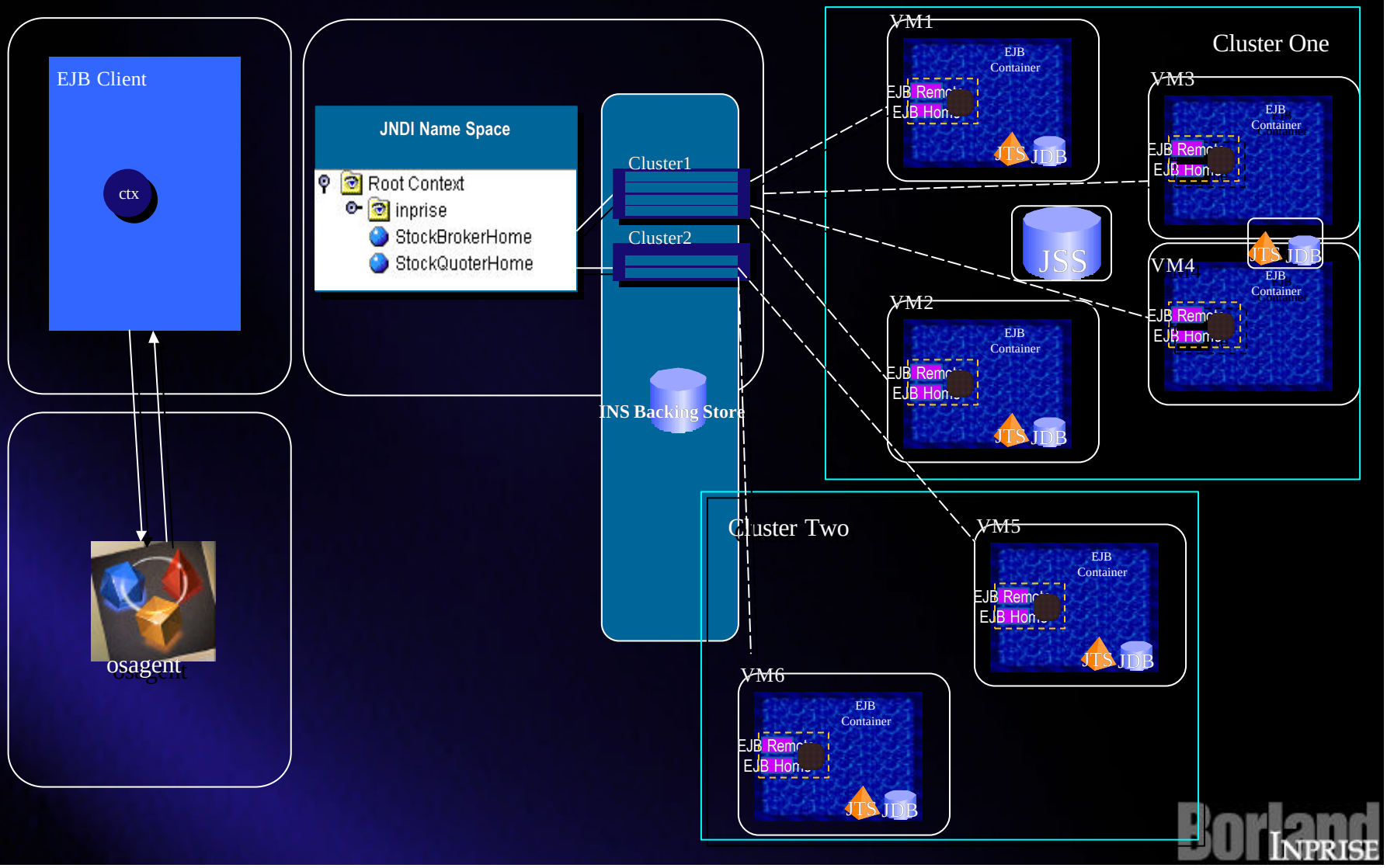
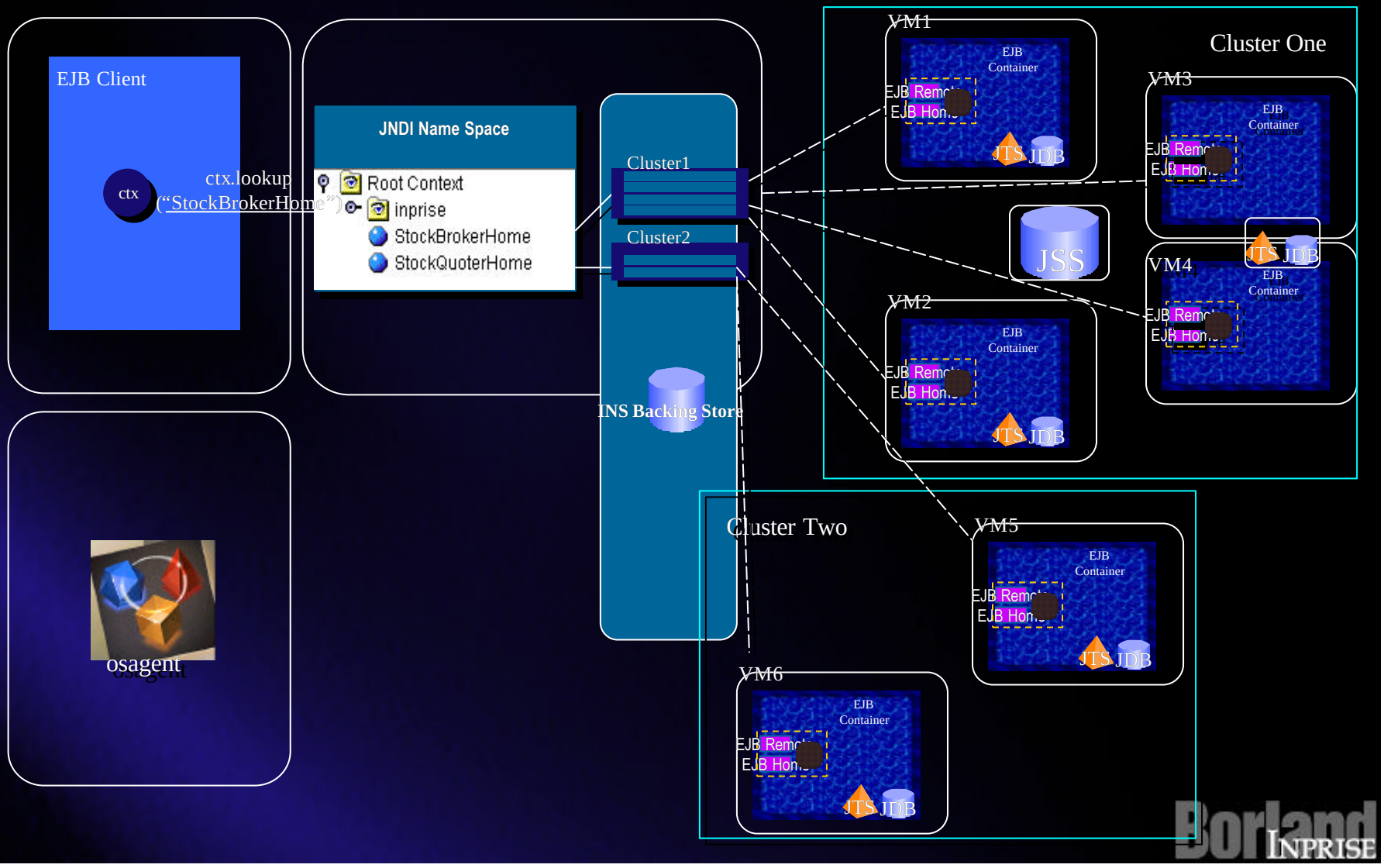
Interoperable Naming Service supports multiple bindings to a name.



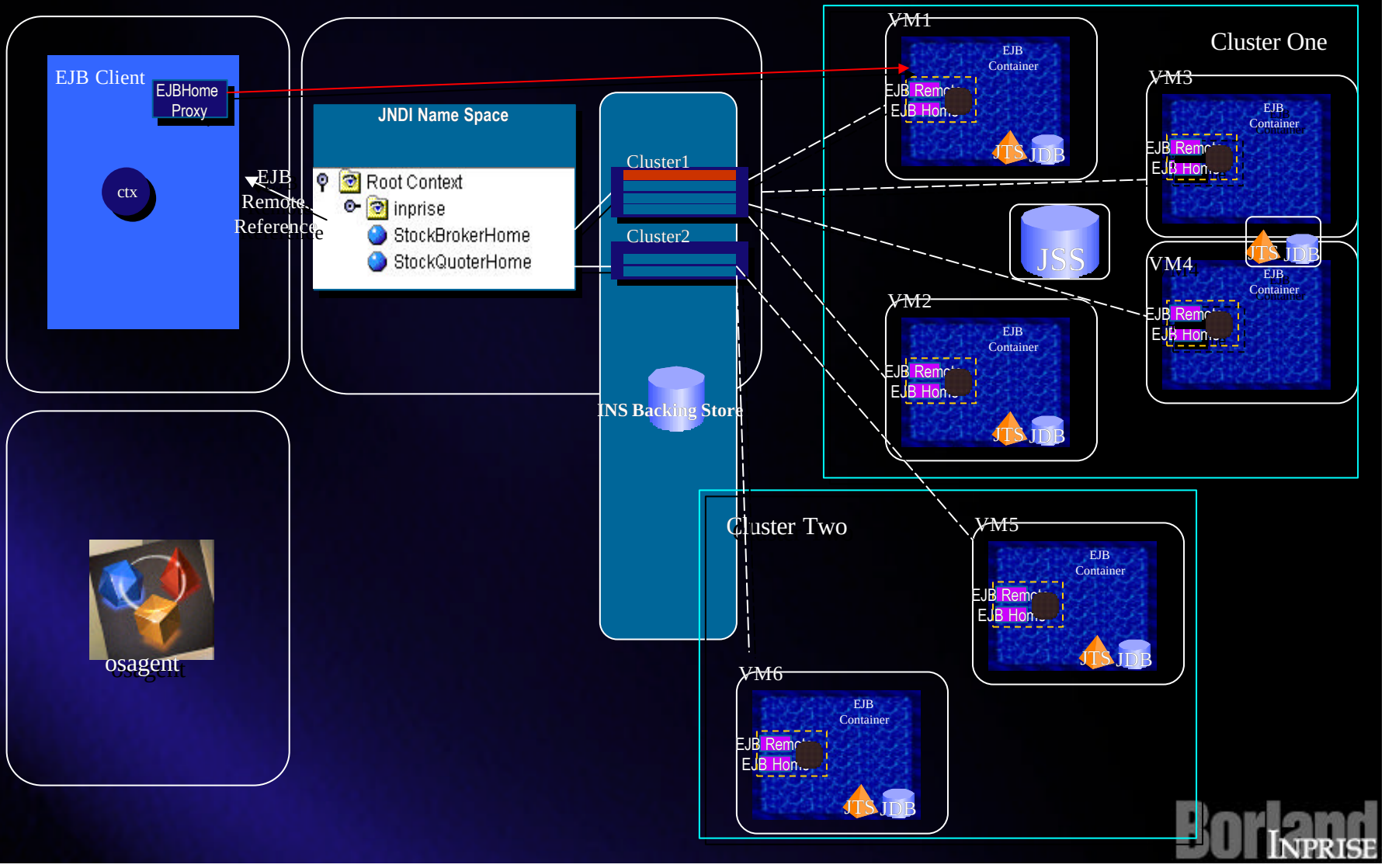
An EJB client then bootstraps to the Interoperable Naming Service.



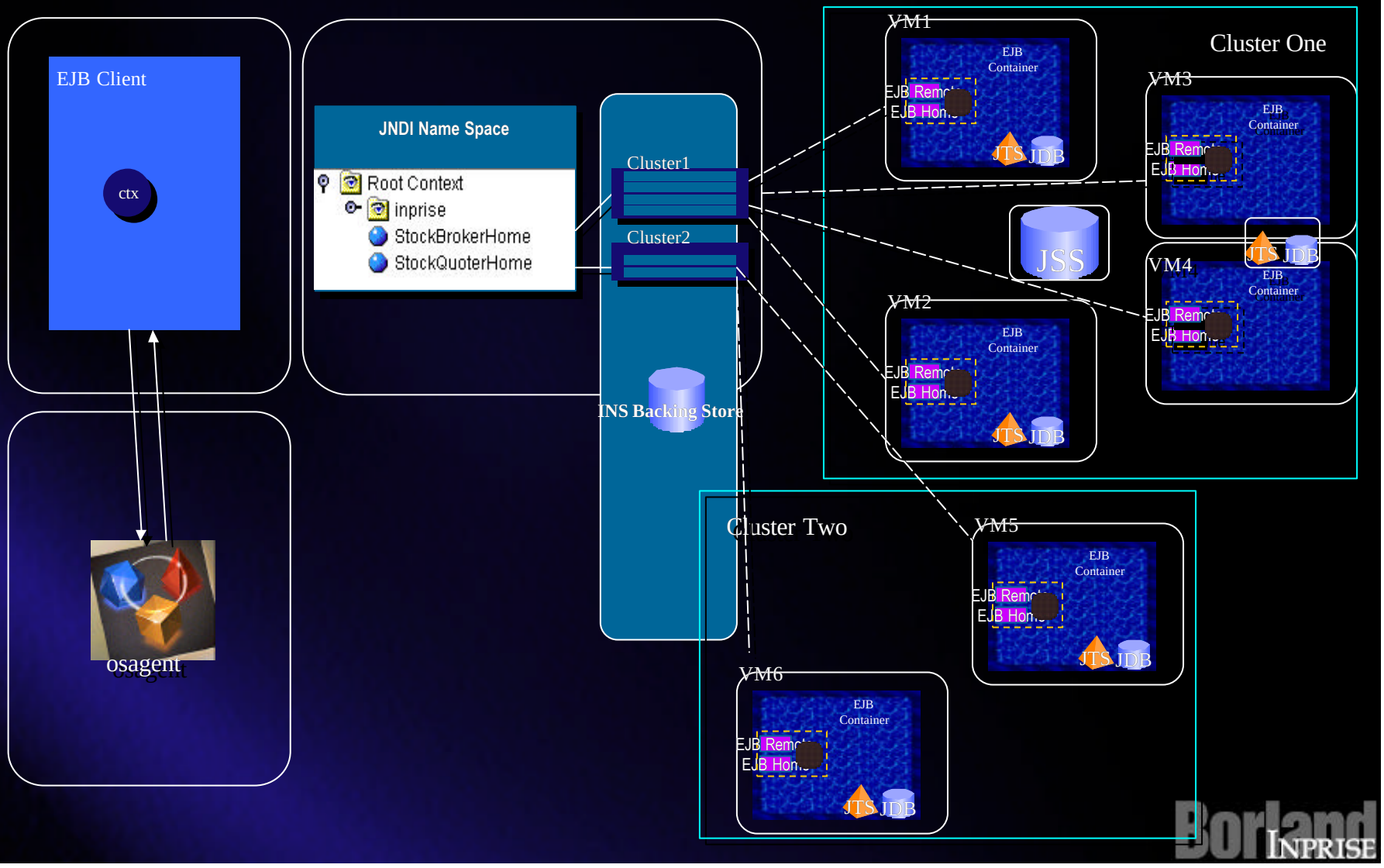
The EJB client looks up a name that resolves to a cluster.



The first reference of a component home in the cluster gets returned.



A new EJB Client starts.



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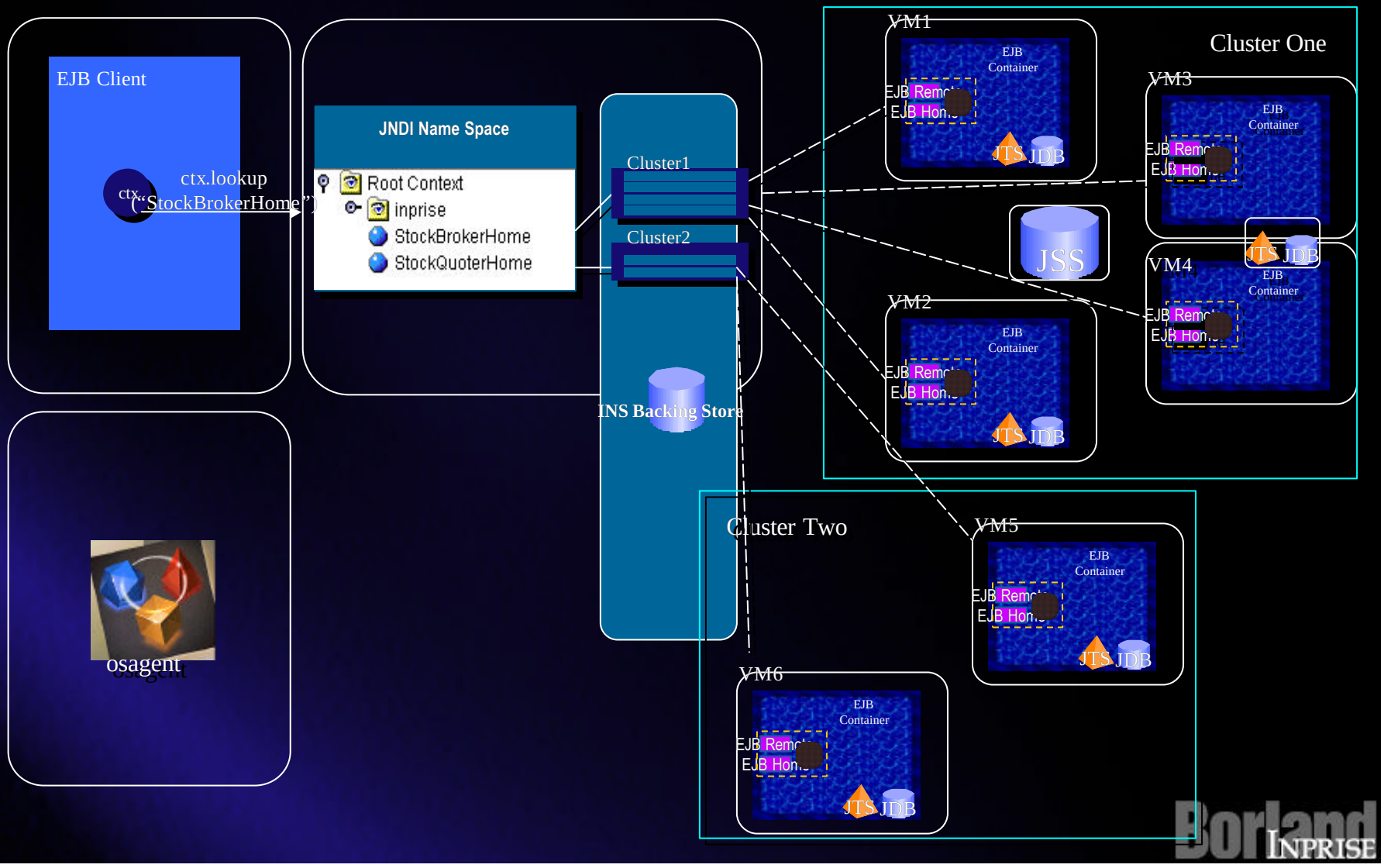
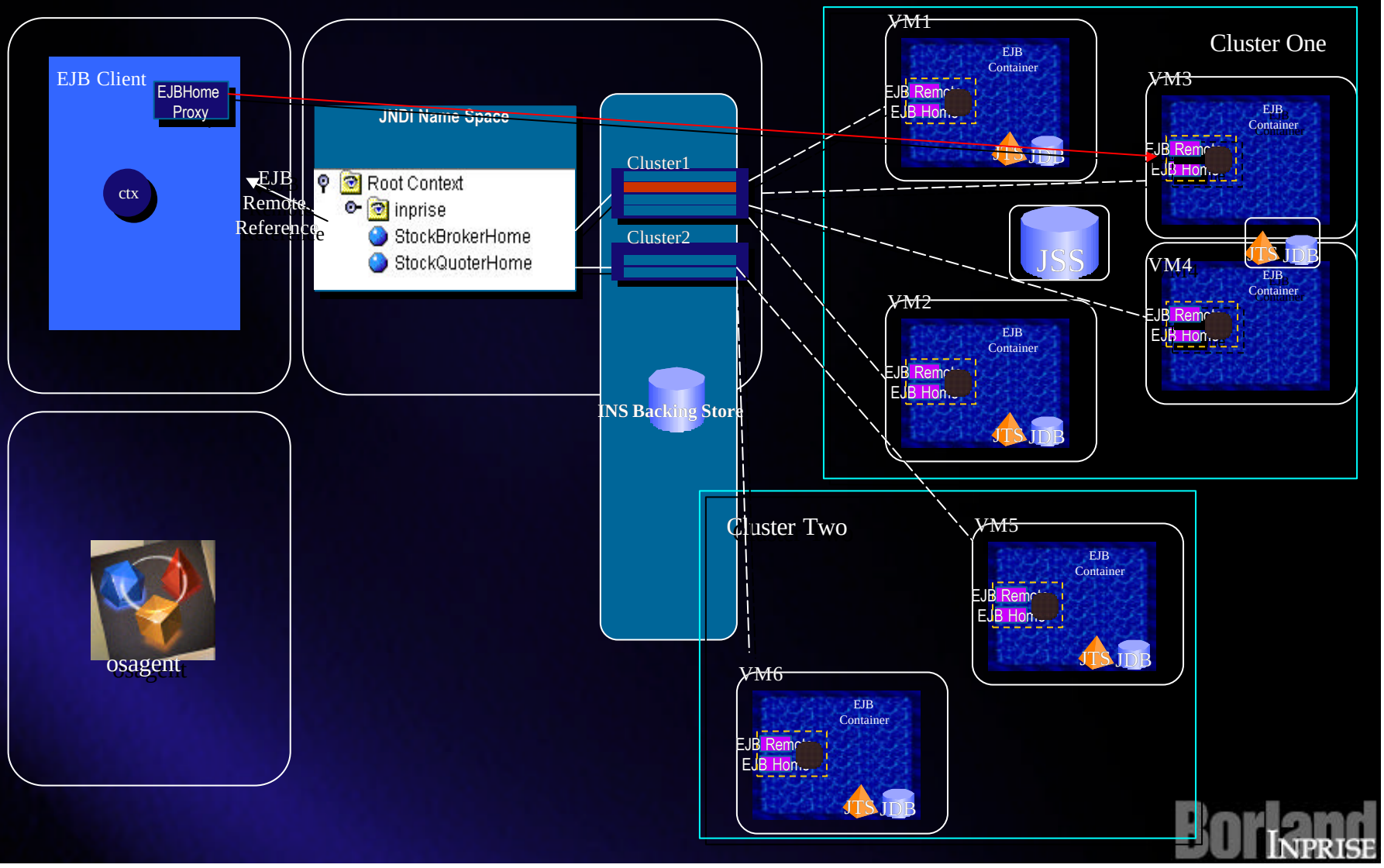
An EJB client looks up a name that resolves to a cluster.



The second reference of a component home in the cluster gets returned.



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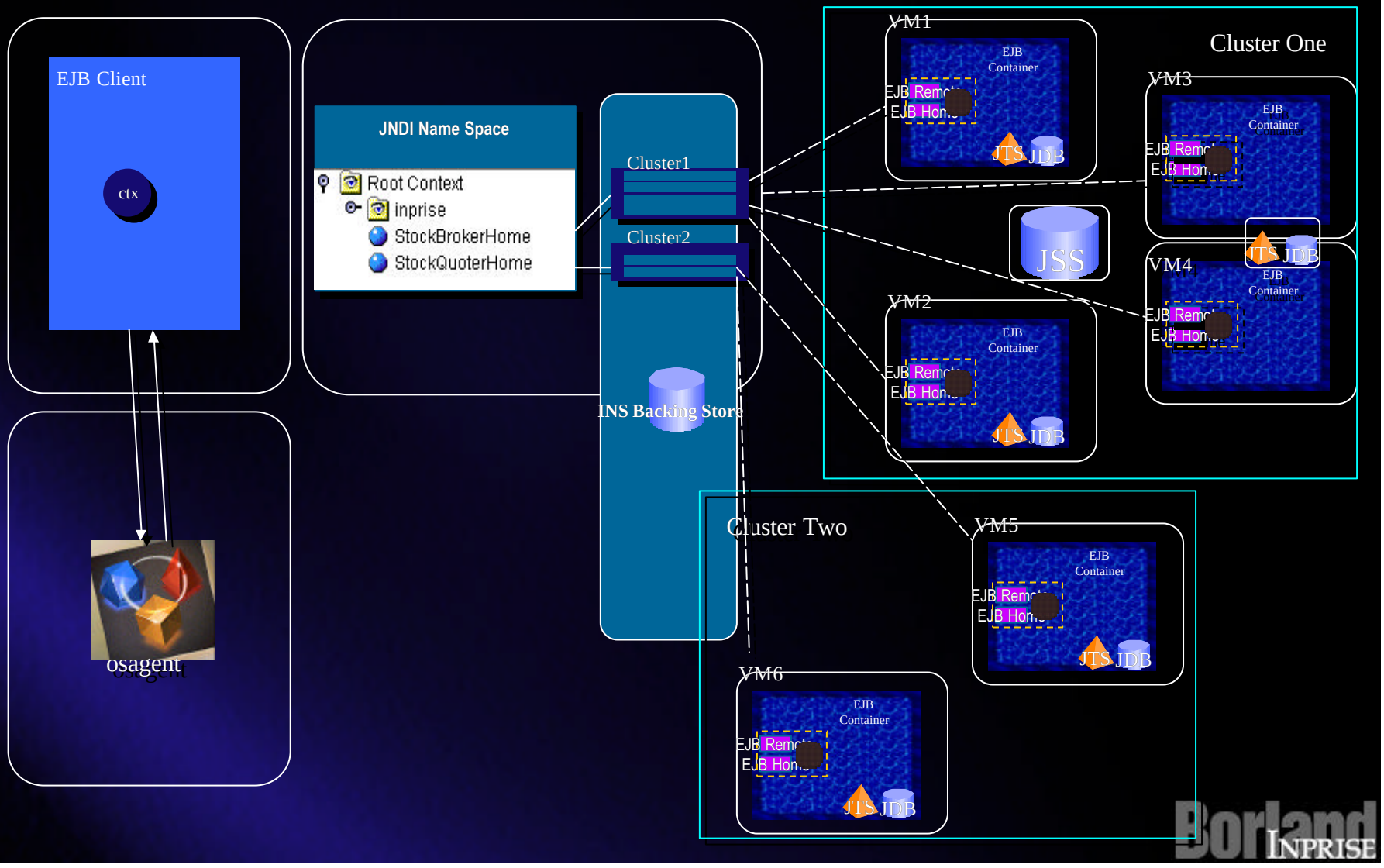
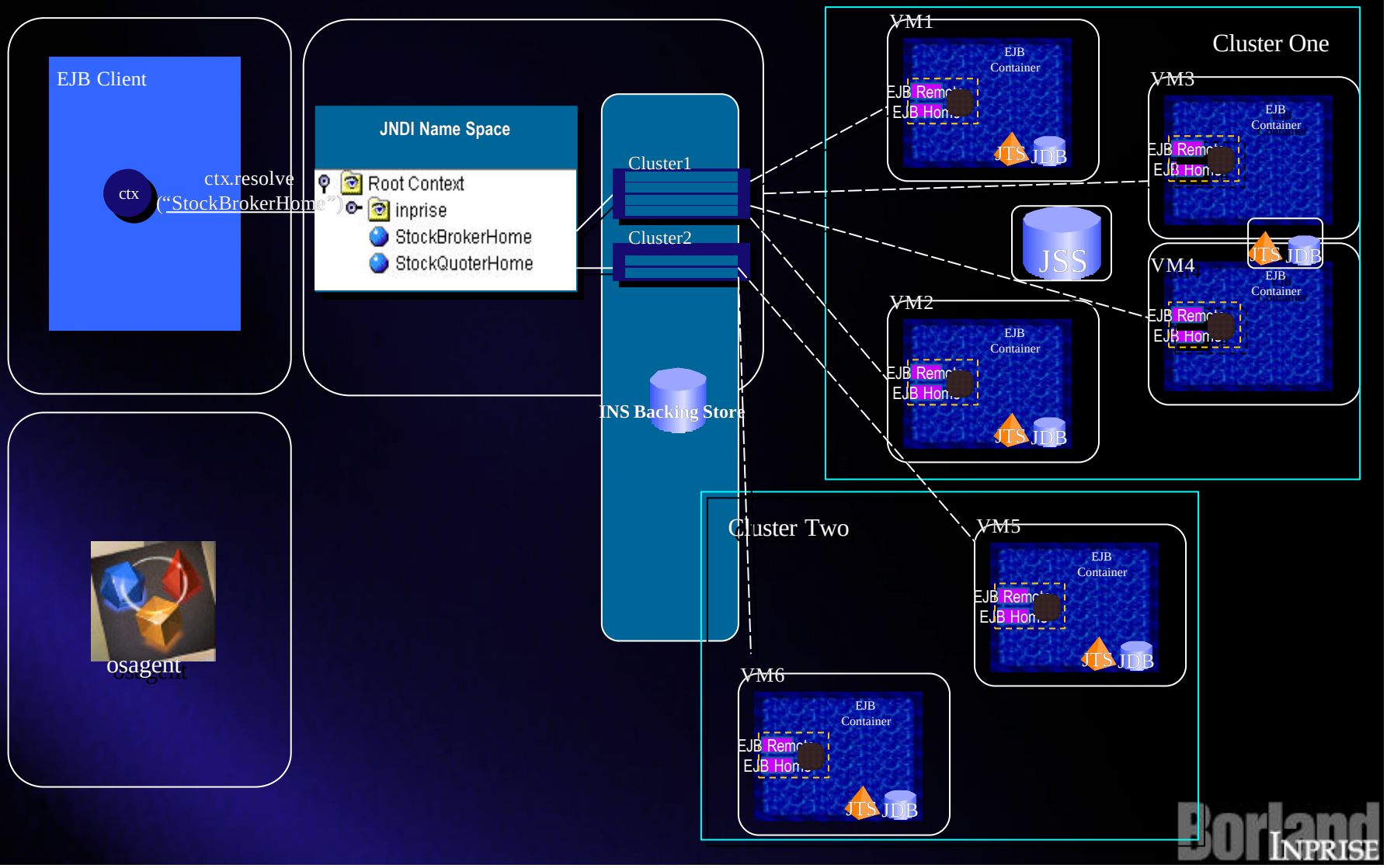
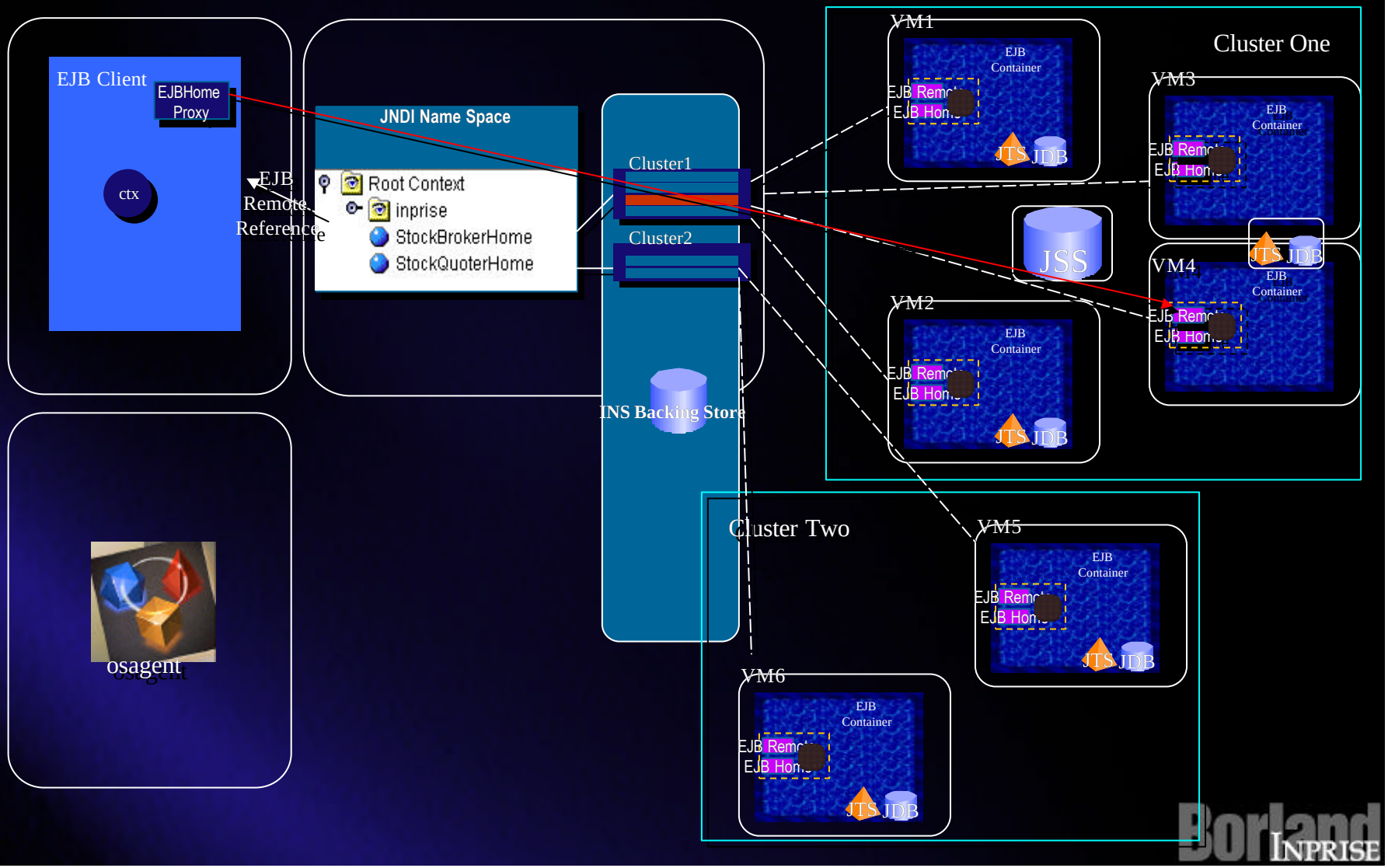
An additional EJB Client starts.



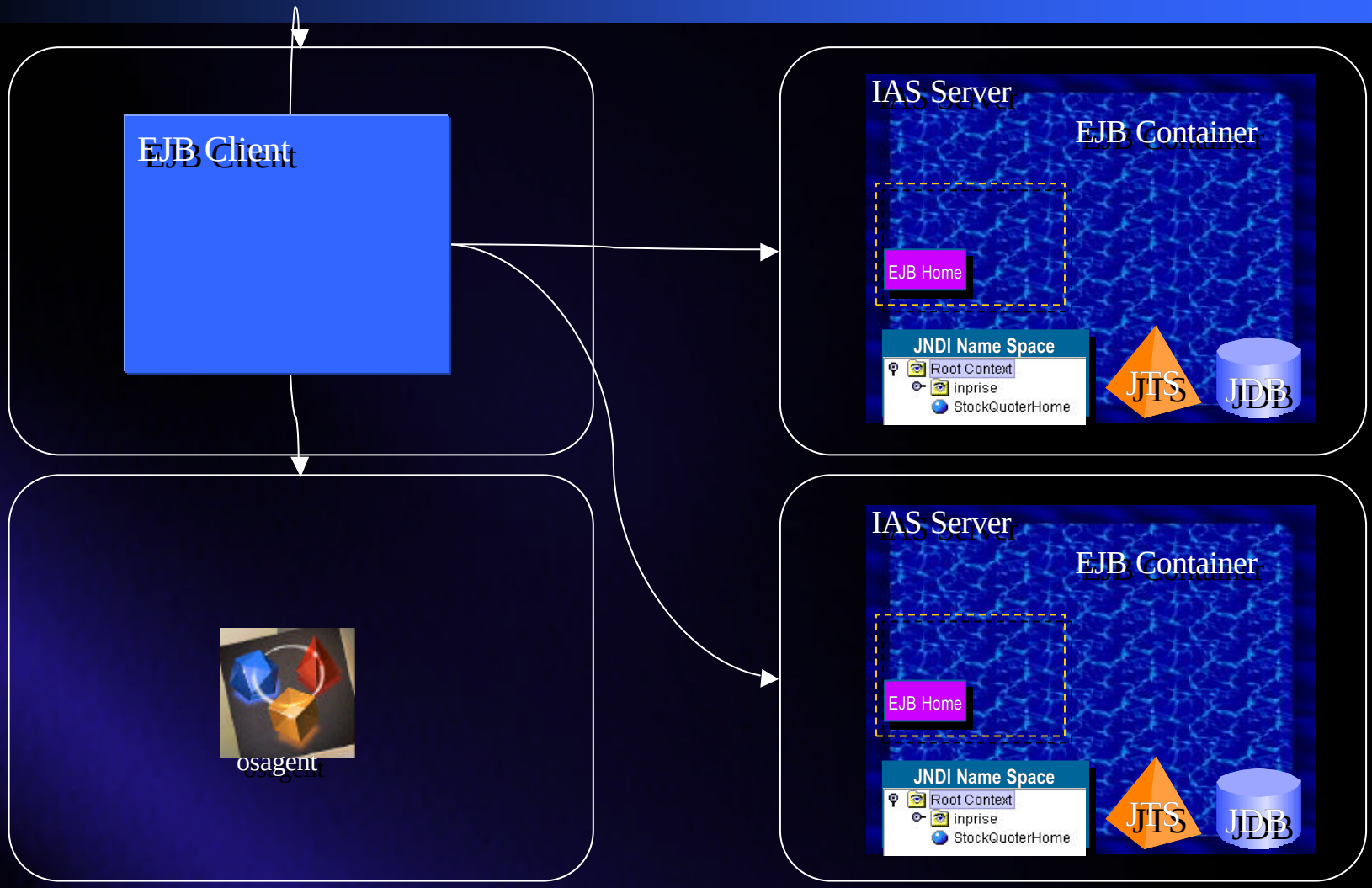
An EJB Client looks up the same name that resolves to the cluster again.



The third reference of a replica component home in the cluster gets returned.



A client starts and creates InitialContext, UDP/IP broadcast occurs to locate an osagent.



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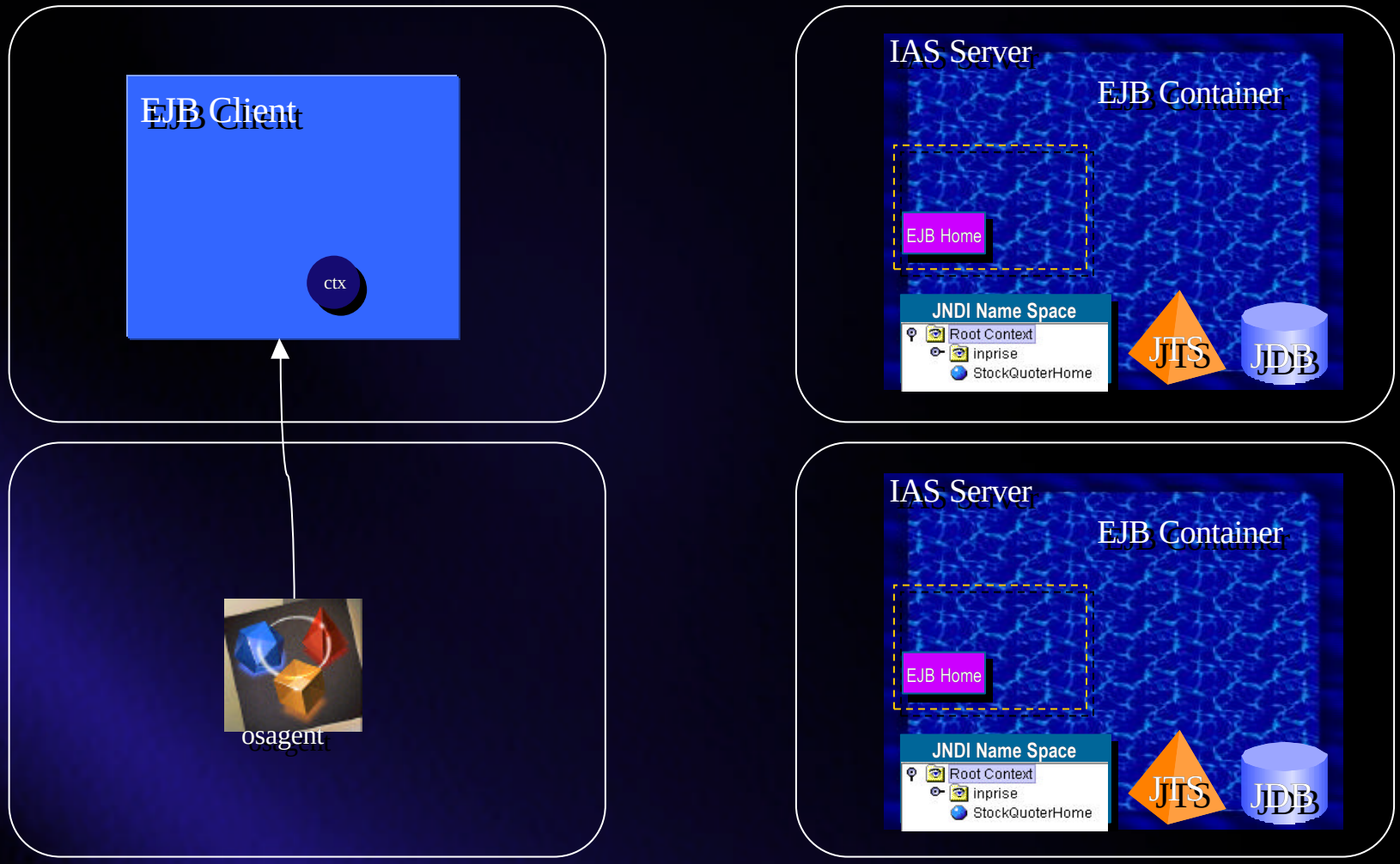
The osagent provides the reference to the JNDI root Naming Context.



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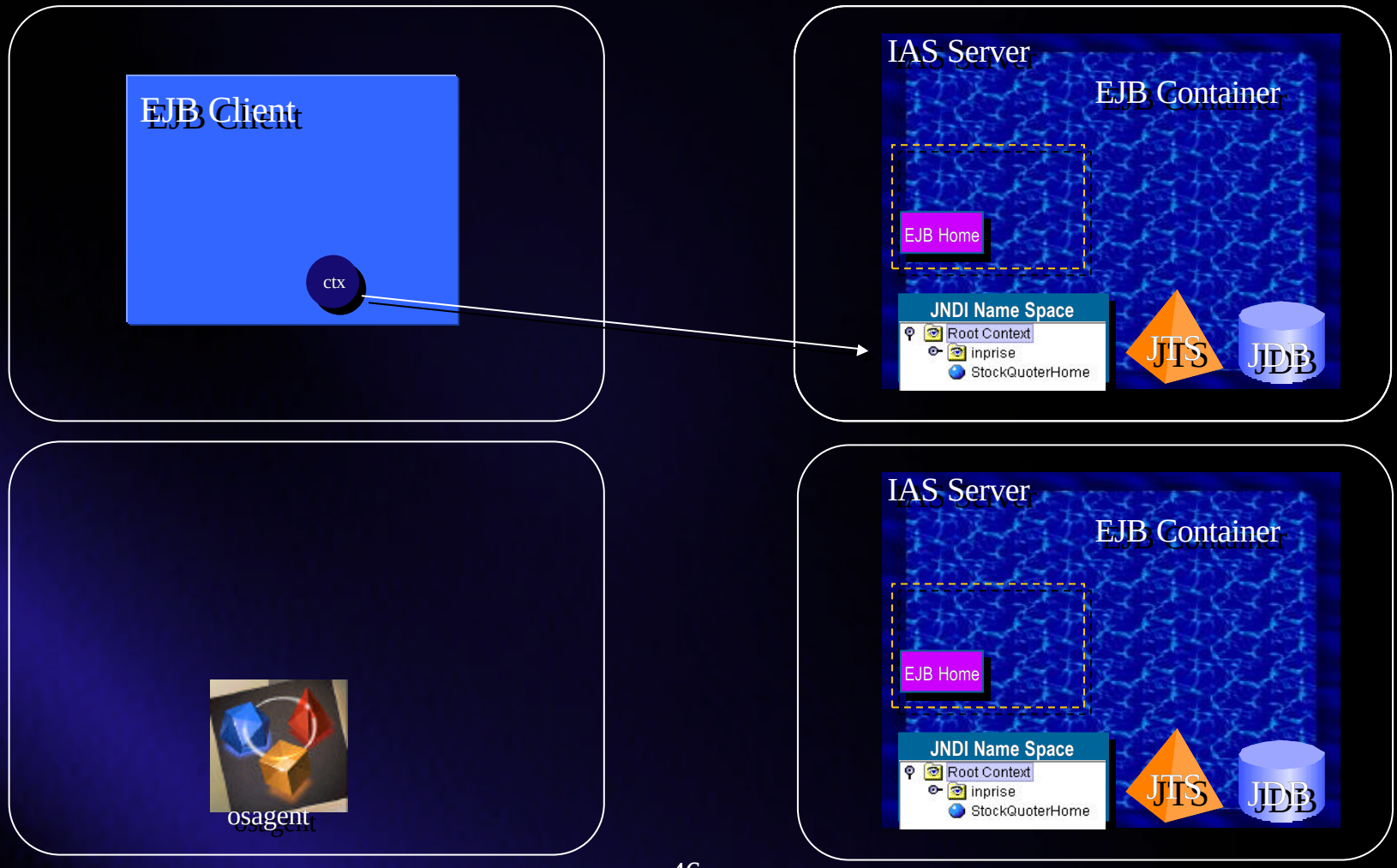
Client tries to use JNDI over CosNaming to lookup the EJB Home object of a component.



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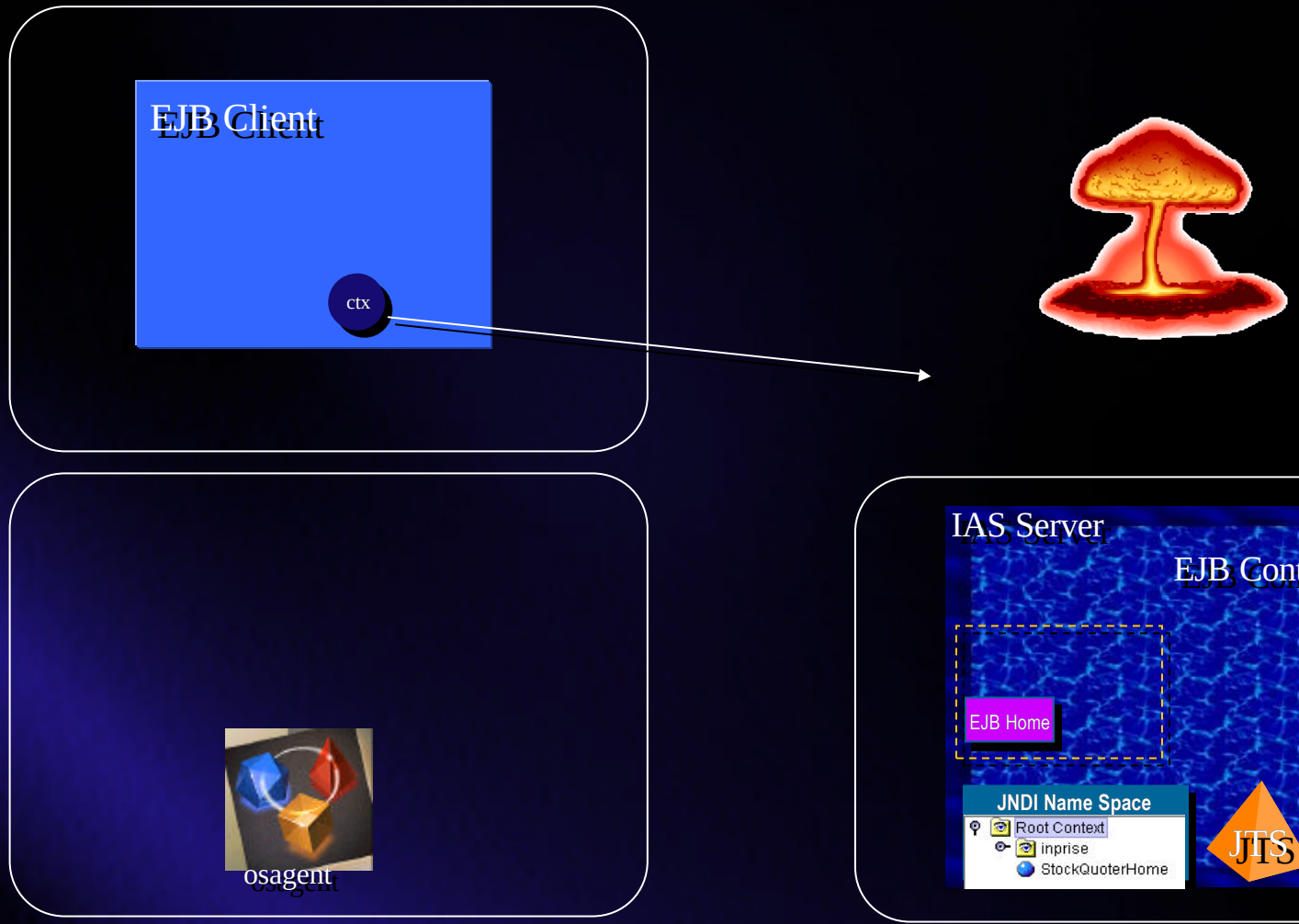
IAS machine crashes.



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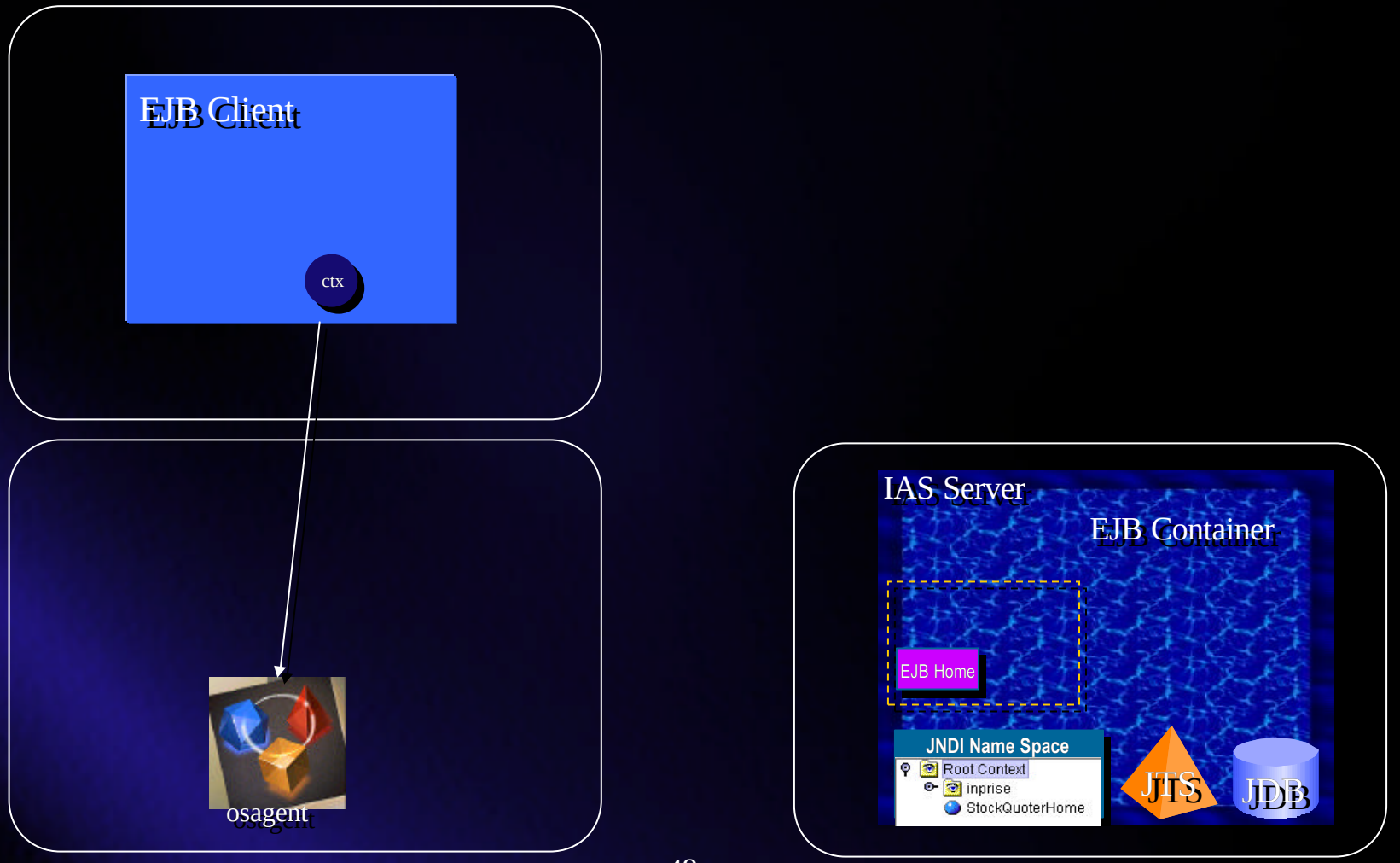
EJB client's runtime rebinds by consulting osagent.



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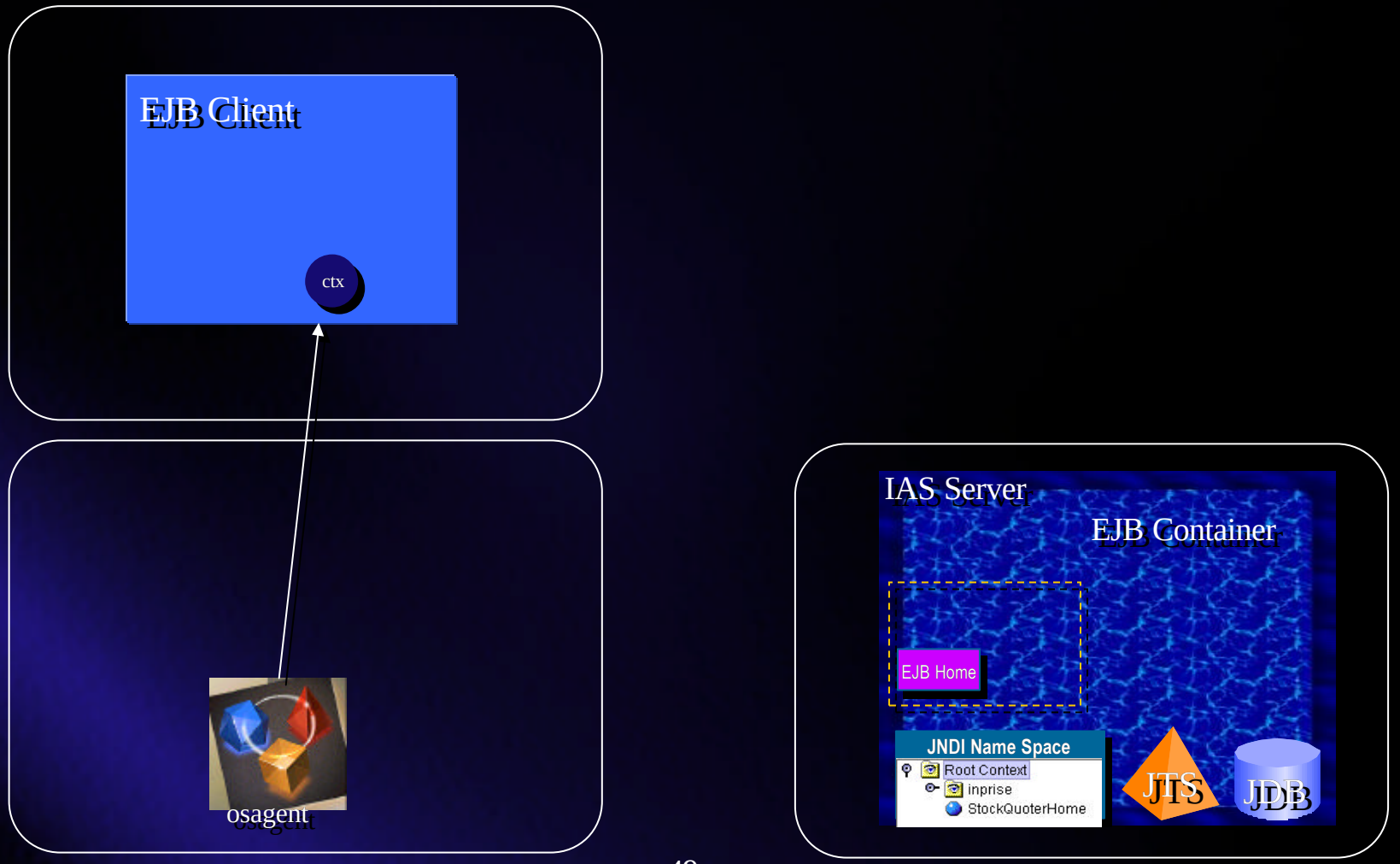
Osagent replies and an InitialContext proxy gets updated.



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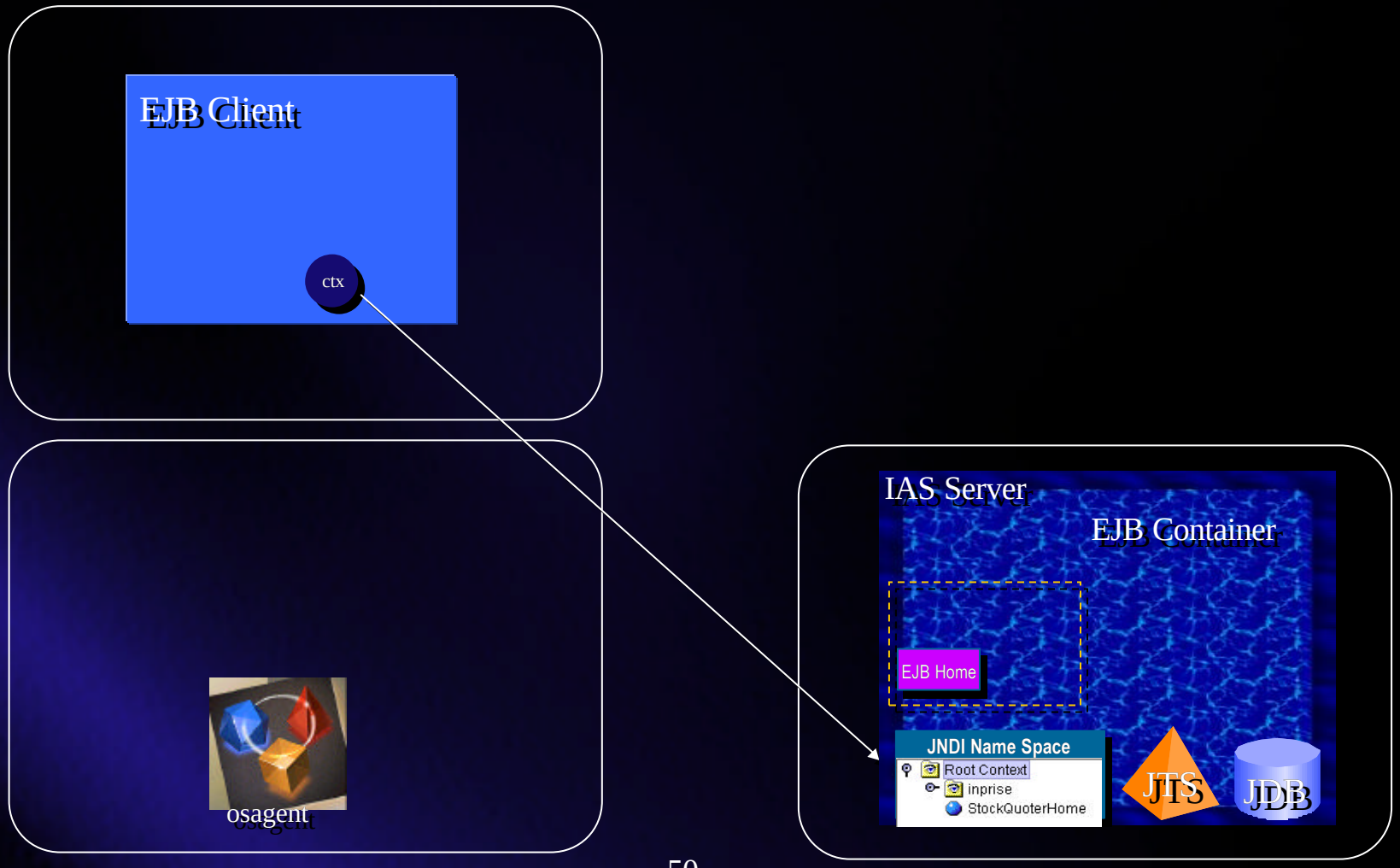
Client tries to use JNDI over CosNaming using the new InitialContext proxy.



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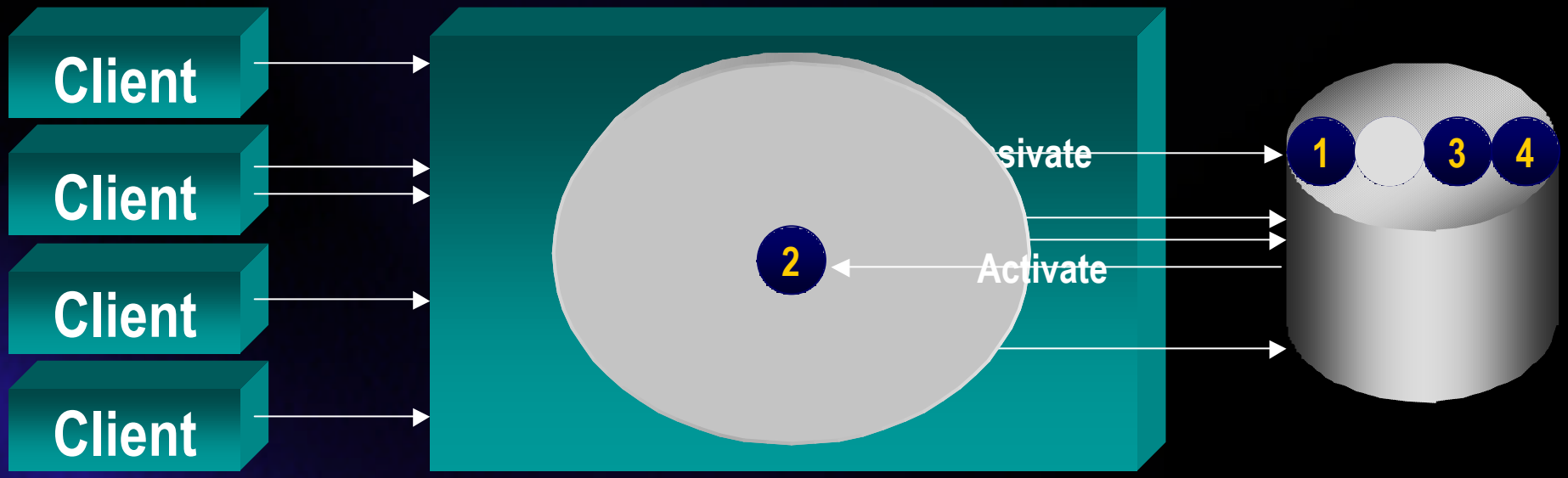
Stateful Caching Architecture



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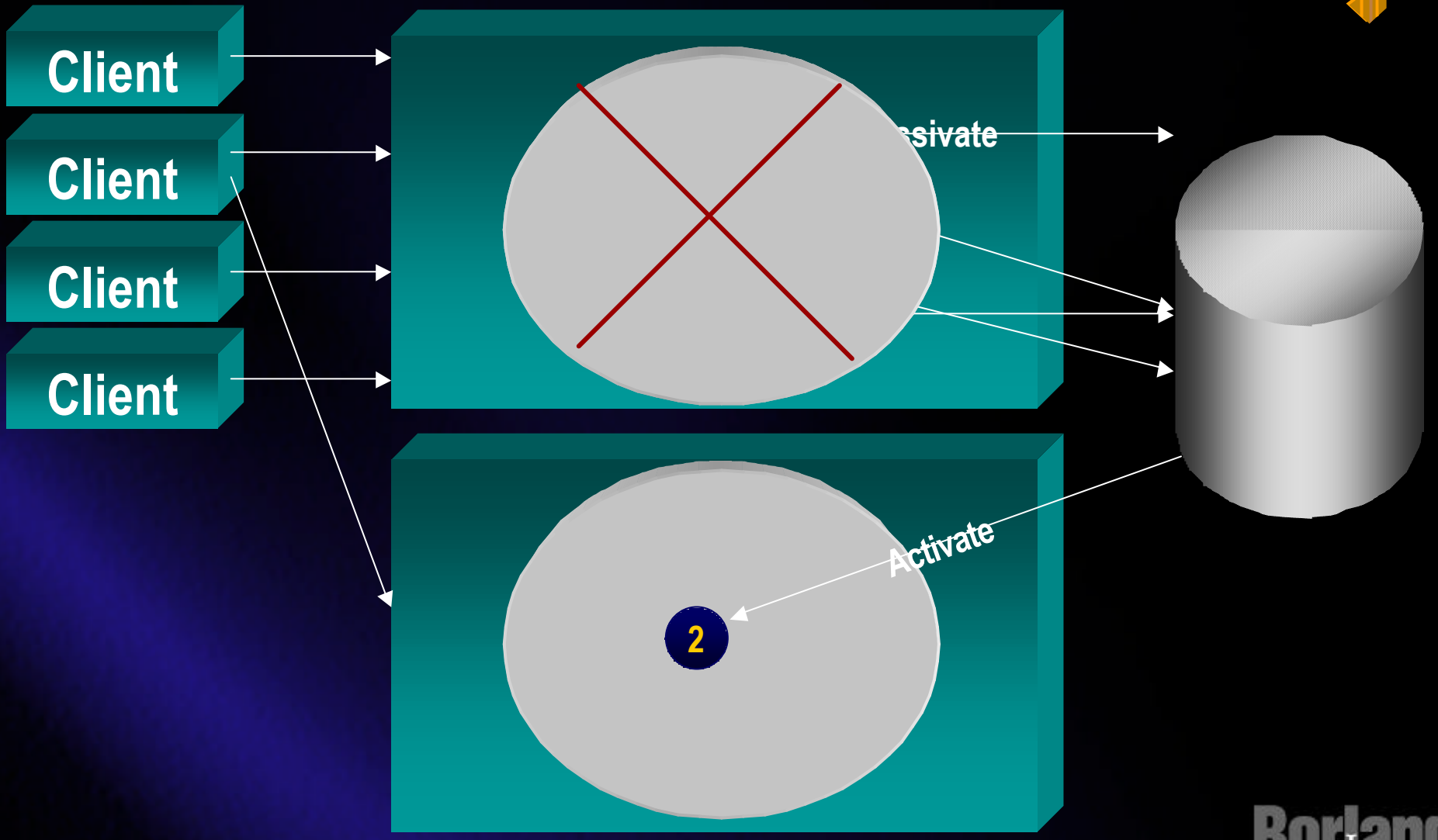
Stateful Caching Architecture



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Data Access

- JDBC 2.0
  - Includes Optional Package
  - JNDI Naming (Used in EJB 1.1)
  - XA Transaction Support
- More portable JDBC code using DataSource
  - JDBC connection data stored in JNDI rather than code

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IAS 4 Implementation

- DataSources declared in XML automatically added to JNDI
- Support for homogeneous distributed transactions using the database transaction coordinator
- Support for heterogeneous distributed transactions using the ITS transaction coordinator and XA
- Automatic Connection Pooling without Code changes!
- Support for JDBC 2.0 Connection Pooling
- JDataStore

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Management

- EJB flexibility poses new challenges to management
  - How do I start the application?
  - Is my Application Up or Down?
  - Ok, its broken… How do I fix it?
  - How do I prioritize things to fix?
- EJB 1.1 lacks a solid management specification

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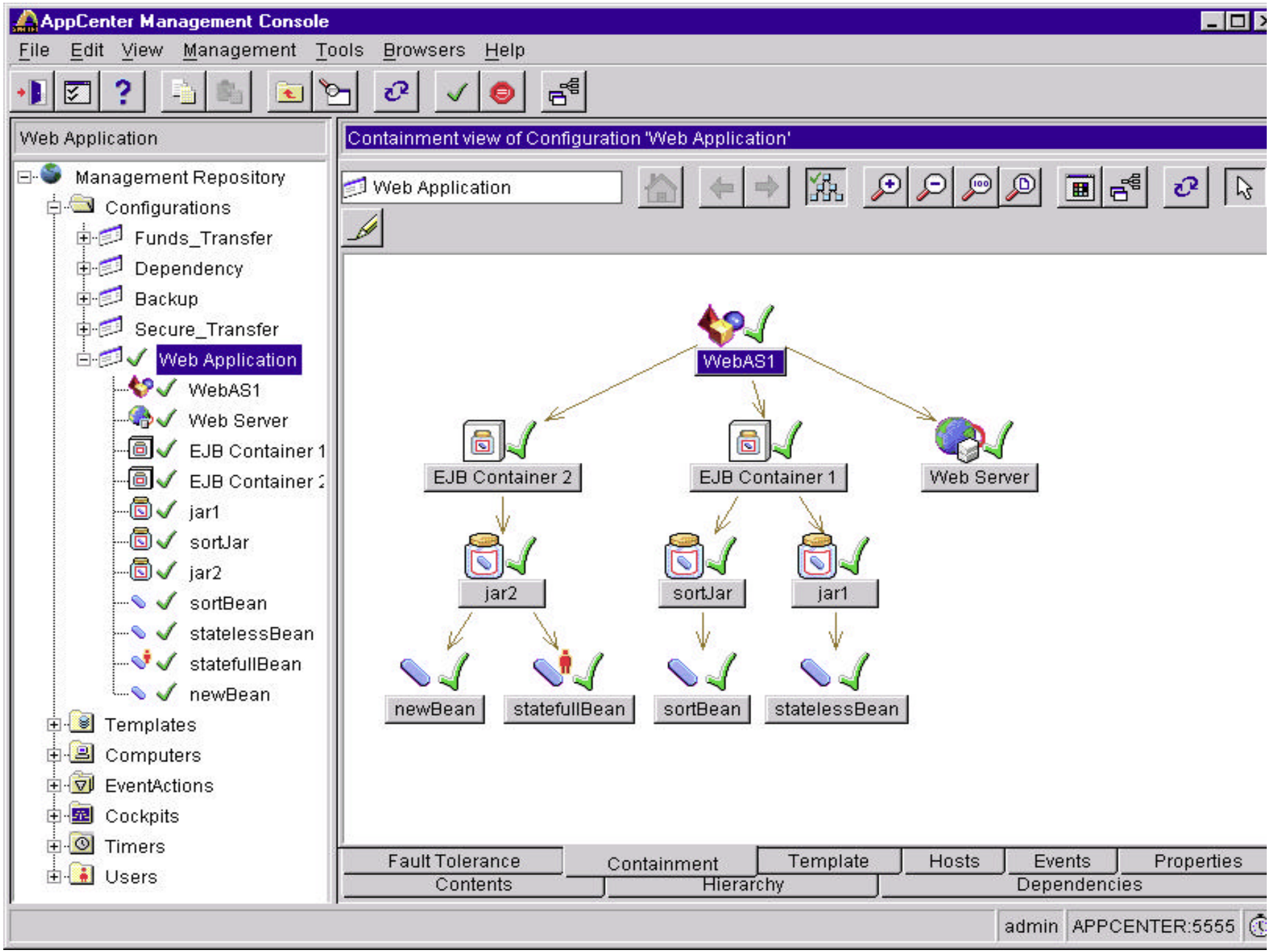
AppCenter Management Console
File Edit View Management Tools Browsers Help
Web Application
Management Repository
Configurations
Funds_Transfer
Dependency
Backup
Secure_Transfer
Web Application
WebAS1
Web Server
EJB Container 1
EJB Container 2
jar1
sortJar
jar2
sortBean
statelessBean
statefullBean
newBean
Templates
Computers
EventActions
Cockpits
Timers
Users
Containment view of Configuration 'Web Application'
Web Application
WebAS1
EJB Container 2
EJB Container 1
Web Server
jar2
sortJar
jar1
newBean
statefullBean
sortBean
statelessBean
Fault Tolerance
Containment
Template
Hosts
Events
Properties
Contents
Hierarchy
Dependencies
admin
APPCENTER:5555

IAS 4 Web Features

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Web Features

- Dynamic Web Page Content
  - JavaServer Pages 1.1
- Flexible security model
  - Access Control by user or group
  - SSL 3.0
- Extensible
  - Extend server with Java Servlet API 2.1
- Session support
  - Automatically manages session life cycle

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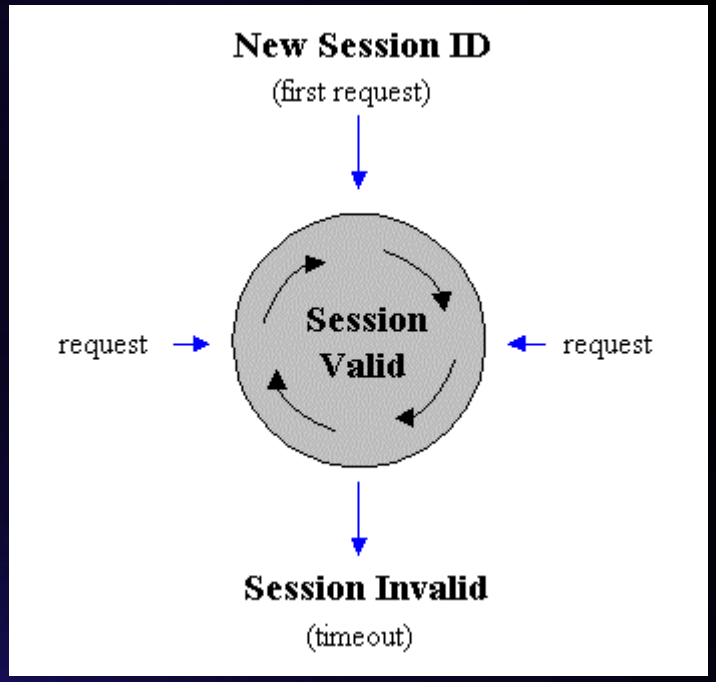
Web Server Integration

A session corresponds to a single sitting of a single anonymous user (anonymous because no explicit login or authentication is required to participate in session tracking



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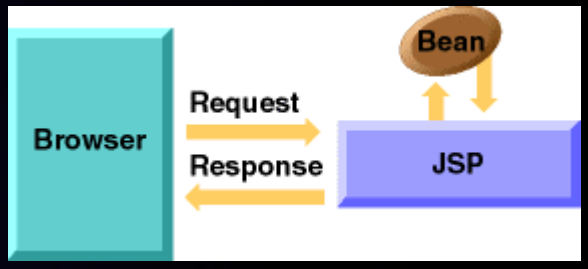
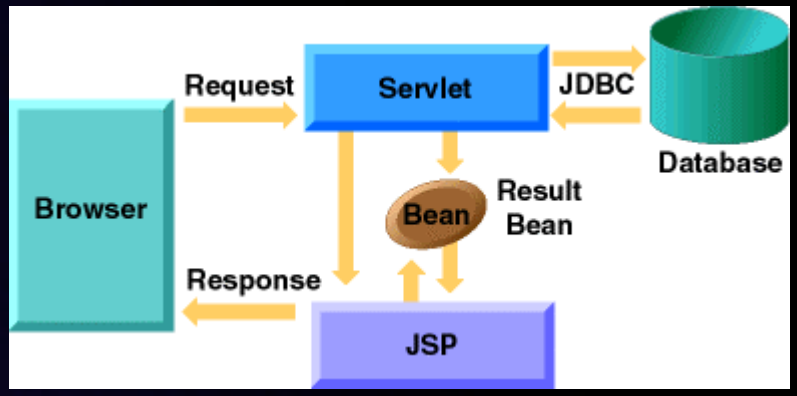
Java Server Pages (JSP)

- Direct Access Model



- Servlet/JSP Model



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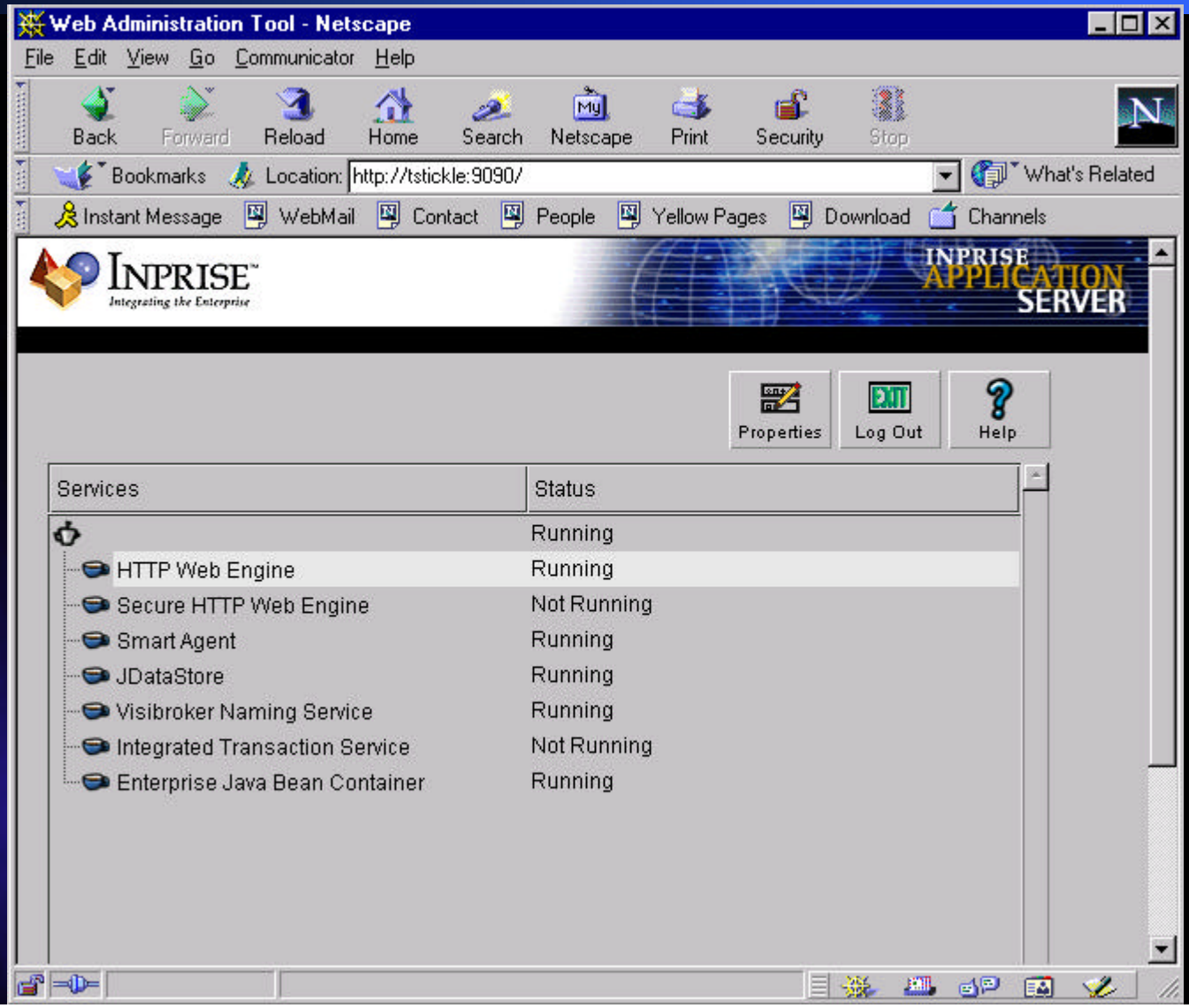
Administration



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Web Server Integration

- Integrate EJB Container(s) and Web Server as services as part of Application Server
  - Ability to run all of the services as part of single process or distribute individual services
  - EJB Server can run with or without Web Server
- Support for Apache, Microsoft, Netscape servers

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Overall Configuration

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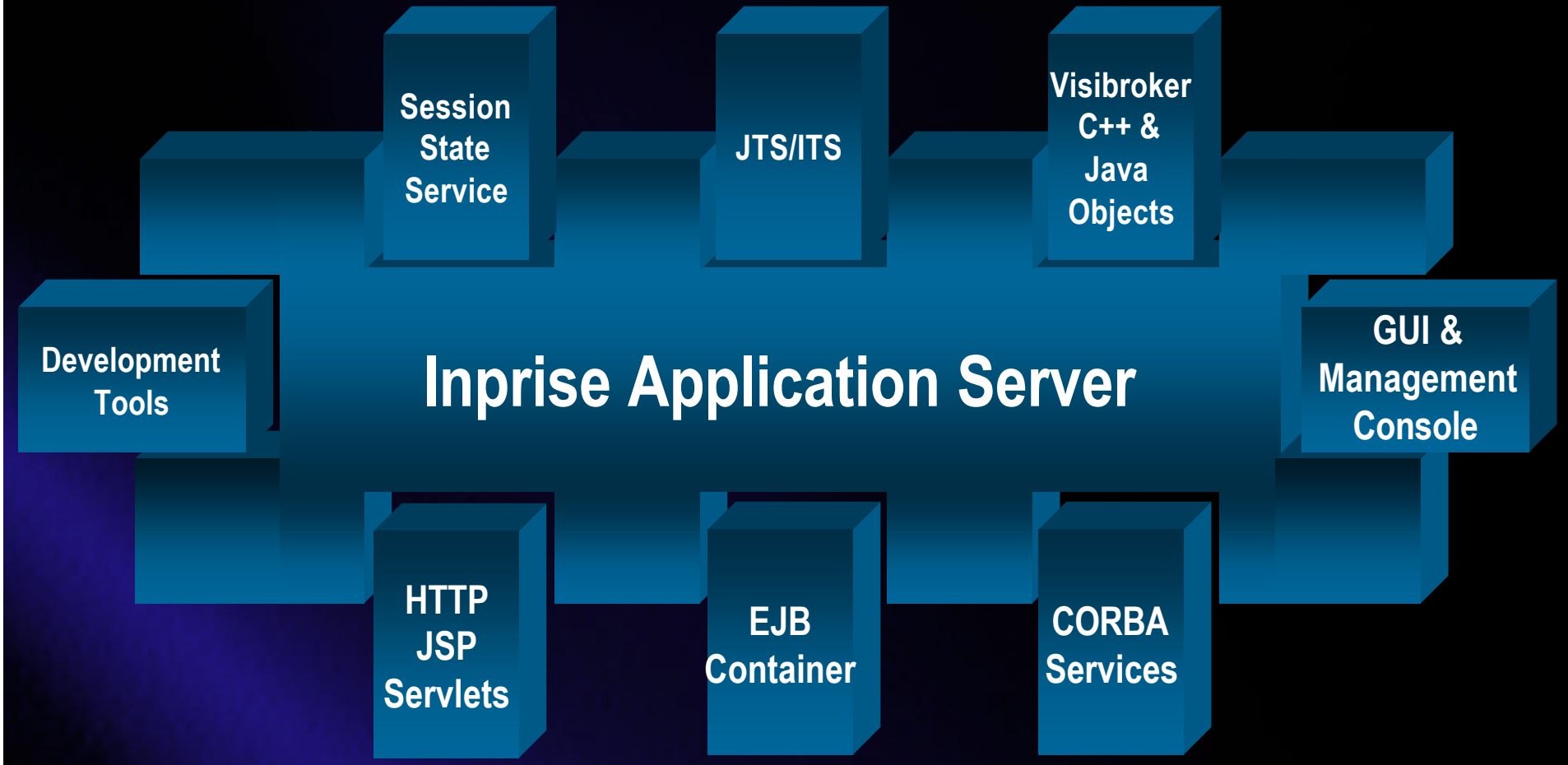
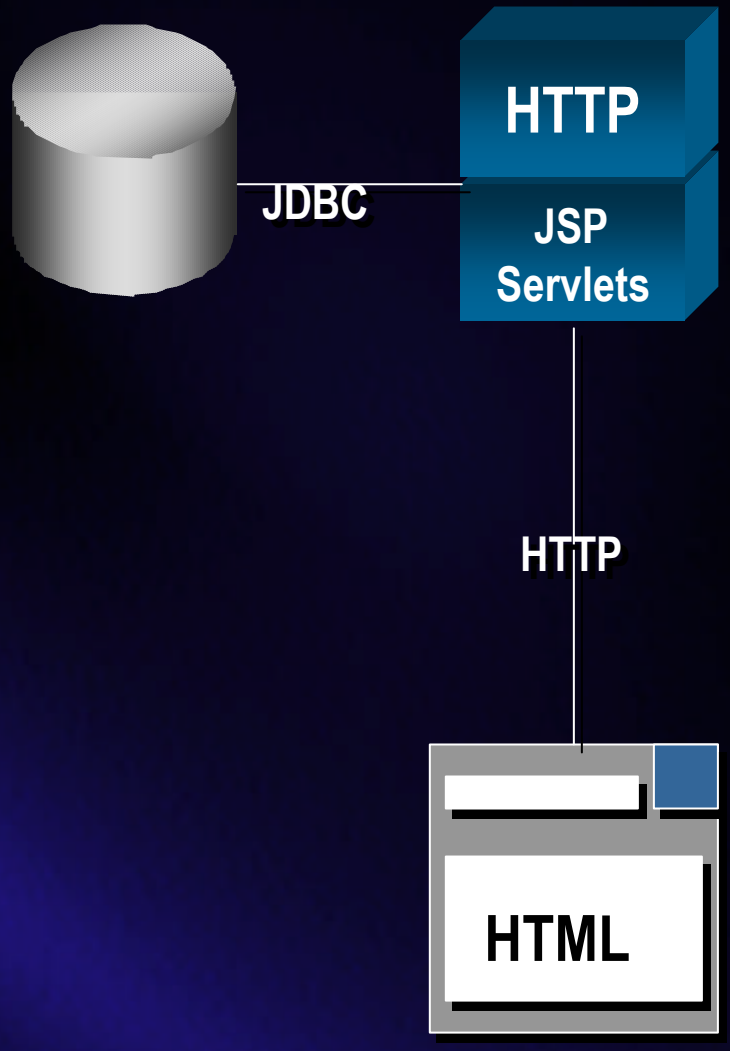
The IAS 4 Architecture



Lightweight Configuration



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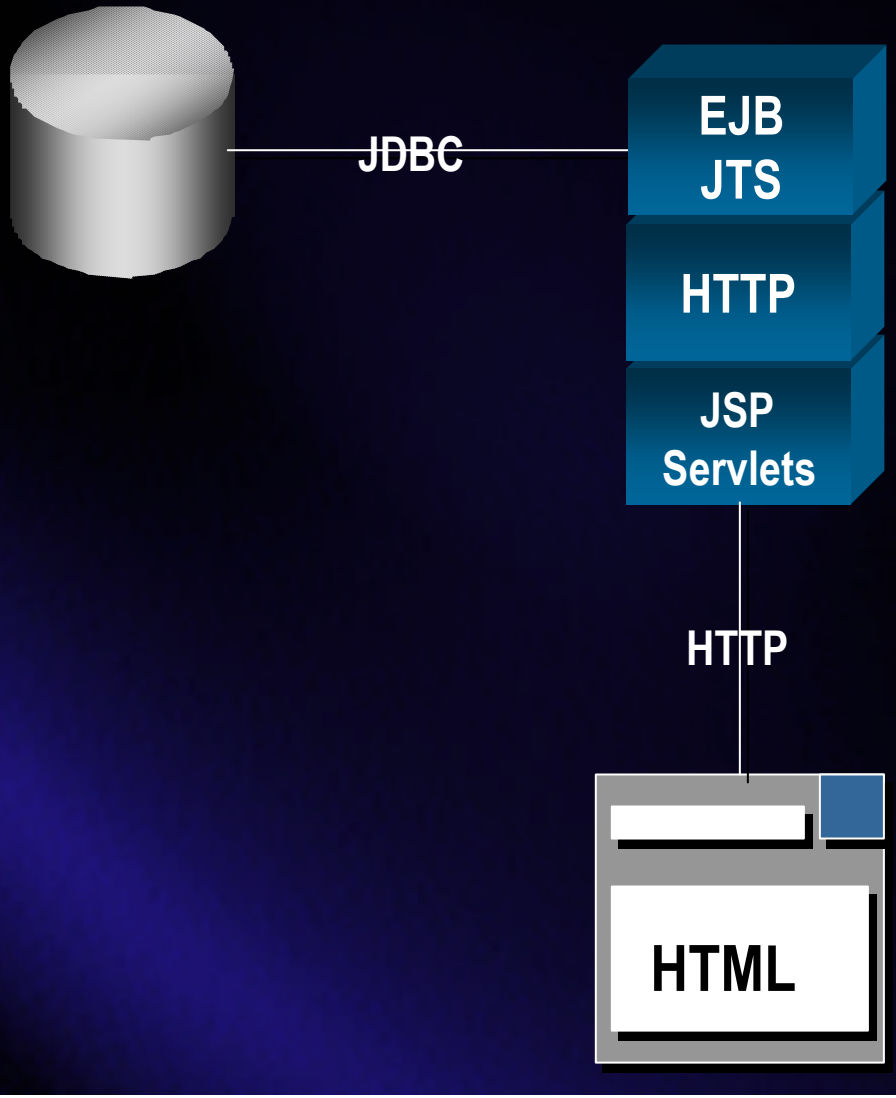
Compact Configuration



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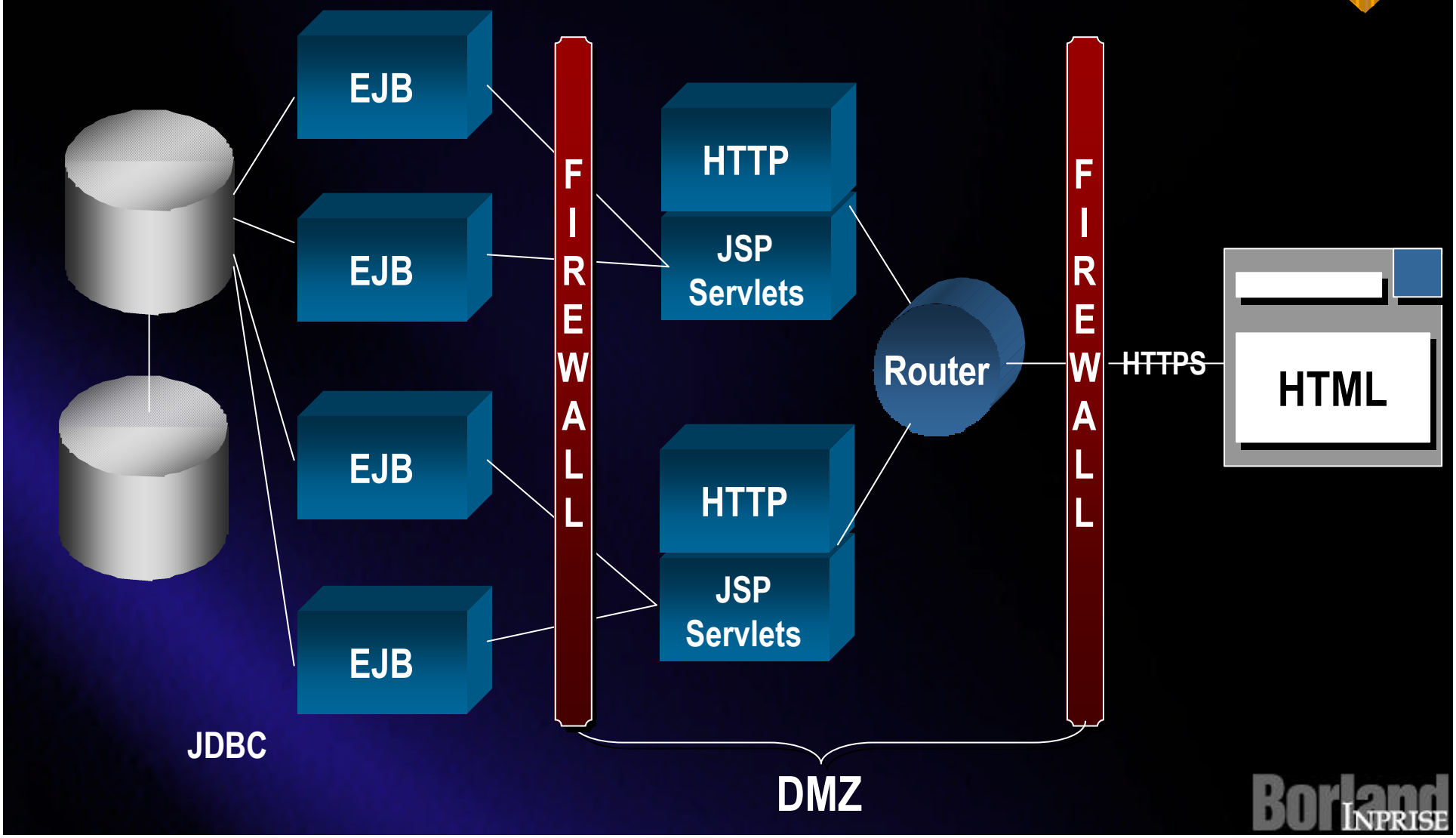
Enterprise Configuration



Inprise Application Server 4

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