Enterprise JavaBeans

Jens Gustavsson

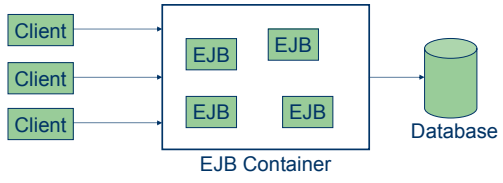
Introduction

- EJB Container / Application server
  - Manages beans
  - Provides middleware services
- Part of J2EE, standard from Sun
- Implementation by independent tool vendors
  - IBM, Oracle, BEA, Borland, …
  - Open source: JBoss (www.jboss.org)

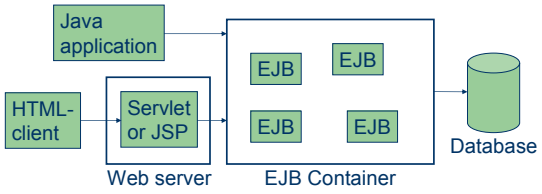
Introduction

- Enterprise JavaBeans ≠ JavaBeans
- Server side component architecture
- Separation of business logic from middleware services:
  - networking
  - transactions
  - persistence
  - logging
  - resource pooling

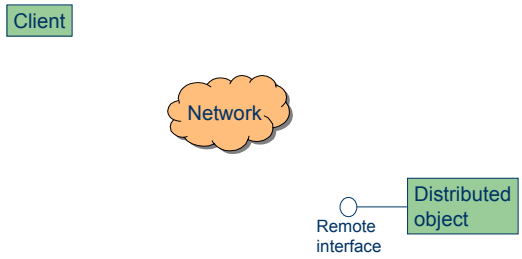
EJB Architecture



Clients



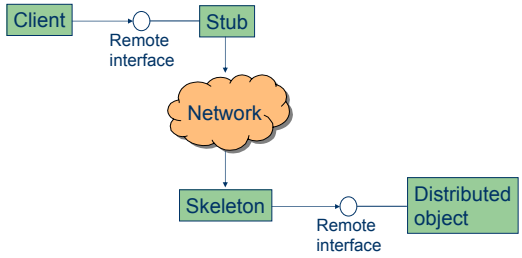
Distributed Objects



Implicit Middleware

- Explicit middleware (e.g. CORBA) :
  - Write to API
  - Difficult to write, maintain and support
- Implicit middleware (e.g. EJB)
  - Write isolated business logic
  - Declarative middleware service specifications
  - Middleware services automatically
  - Limitations by architectural constraints

Distributed Objects



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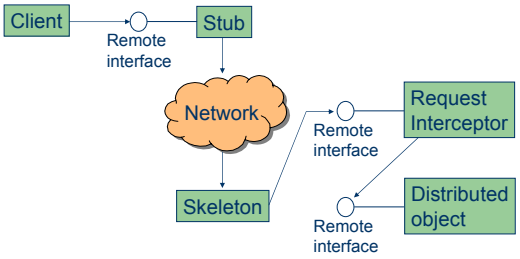
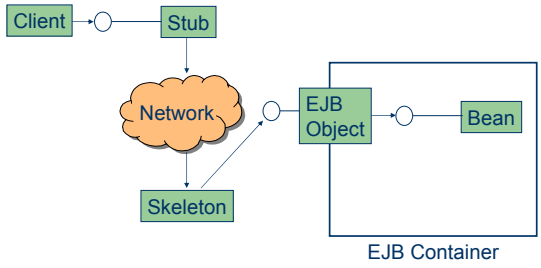
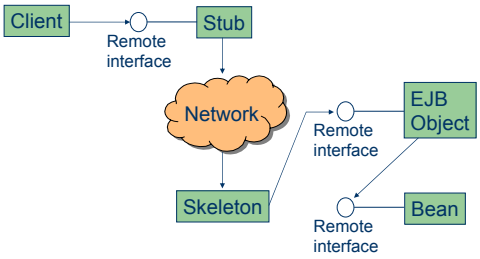


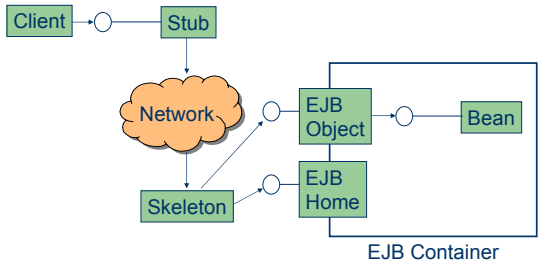
Enterprise JavaBeans



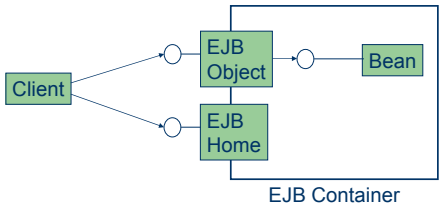
Distributed Objects the EJB way



EJB Home Object



EJB Architecture



Deployment

- JavaBeans - for development
- Enterprise JavaBeans - for deployment
- Deployment descriptor language is a composition language
- Deployment in practice
- EJB-jar file is verified by container
- Container generates stubs and skeletons

What does an EJB consist of?

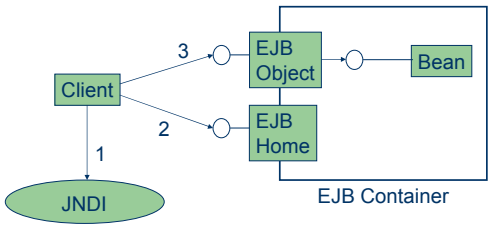
- Enterprise Bean class
- Supporting classes
- EJB Object
- Remote interface
- Home object
- Deployment descriptor (XML)
- Vendor-specific files
- (Local interface)

EJB-jar file

How to find a home object

- Java Naming and Directory Interface (JNDI)
  - Similar to CORBA naming service
  - Mapping between resource names and physical locations
- No machine address to home object hard coded
  - Address to JNDI server is needed

EJB Architecture



So, what does the container do?

- Generate stubs and skeletons
- Create EJB instances as needed. Pooling instances.
- Persisting entity beans.
- Handles security and transactions via EJB object

Different kinds of Beans

- Session beans
  - Stateless
  - Stateful
- Entity beans
- Message-Driven beans

How can container vendors compete?

- Caching strategies
- Development tool integration
- Database access optimization
- Performance

XDoclet

- Remote interface, home interface, local interface, local home interface, primary key class, deployment descriptor, vendor specific files
- Specification in comments in Bean class

Local interfaces

- When beans calls beans locally
- Optimization
- Calls by value/reference problem

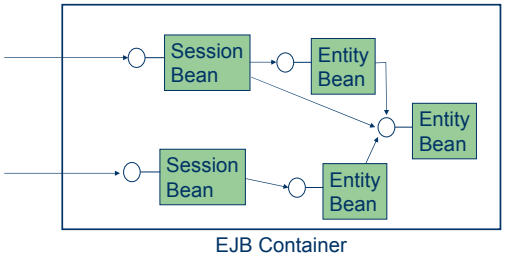
Demonstration

Our first bean

How is Persistence Achieved?

- Bean managed persistence
- Container managed persistence:
  - Object to relational database mapping (common)
  - Object databases (uncommon)
  - Container generates persistence as subclass
  - EJB-QL, query language
- An entity bean should be seen as a view into the database

Façade design pattern for EJB



Demonstration

En entity bean

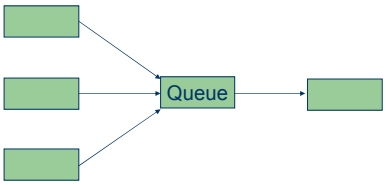
Security

- Authentication - JAAS
- Authorization
- Deployment descriptor
  - Roles
  - Roles and methods
- No instance level based security

Message-Driven beans

- Don't have home, remote or local interfaces
- Have a single business method:
  - onMessage
- No static type check
- No return values
- No exceptions
- Stateless

Point-to-Point



Why Message-Driven Beans?

- Performance
- Reliability
- Support for multiple senders and receivers
- Easy integration to legacy systems

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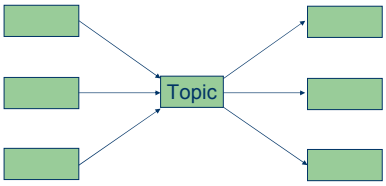

Final thoughts

- Is it object-oriented?
  - Separation of data and operations (entity beans and session beans)
  - No inheritance between beans
- Suitable for which tasks?
  - One architecture. Anomalies if trying to do anything else
- Component marketplace?
  - Not today!

Resources

- Szyperski, chapter 14
- Sun EJB tutorial
  http://java.sun.com/j2ee/learning/tutorial/index.html
- Ed Roman: Mastering EJB
  http://www.theserverside.com/books/wiley/masteringEJB/index.jsp
- JBoss, Open source EJB Container
  http://www.jboss.org