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Java component models

- applets – client side, downloadable lightweight component for augmenting websites display
- JavaBeans – focuses on supporting connection-oriented programming, for clients and servers
- Enterprise Java Beans, EJB – container-integrated services supporting components that request services using declarative attributes and deployment descriptors
- servlets – lightweight componetns instantiated by web server processing web pages
- application client components – uncontstrained Java application

EJB Overview

- EJB Architecture contracts
  - Client view contract between client and container
    - Client can be servlet or JSP, standalone Java application, applet, another EJB (same/different container), web services client
    - Provides development model for clients
  - Component contract between EJB component and its container
    - Runtime environment, development model

EJB Overview

- Client view contract is comprised of
  - Home interface
    - Methods for creating and locating beans
  - Remote interface
    - Business methods for clients
  - Object identity
  - Metadata interface
  - handle

EJB Overview

- component contract
  - Enables EJB method invocations from clients
  - Manages the life cycle of EJB bean instances
  - Implements home and remote interfaces
  - Provides persistence
  - Provides runtime context information
  - Manages transactions, security, exceptions, ...
  - Implements callbacks

EJB Overview

- Deployment process defined
  - Deployment descriptor includes instructions for container on how to control transactions, security, lifecycle, state management, persistence, ...
  - Describes structural and external dependencies of enterprise bean

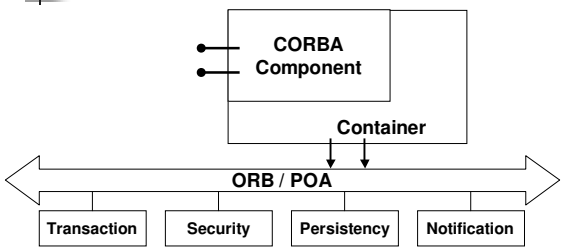
Component model comparison

- both CCM and EJB provide
  - component model with stateless and statefull sessions and entities
  - services for building scalable applications (load-balancing etc)
  - access to components via HTTP or distributed object protocol
  - Transaction support
  - Development tools

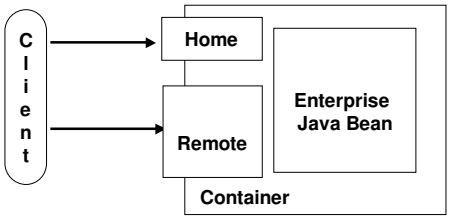
Component model comparison

- EJB interoperability is explicitly defined in the CCM specification
- CCM defines both "container to component" and "container to infrastructure contract"
- CCM's container environment specification is a superset of EJB 1.1 containter environment specification

CCM Container Architecture



EJB Container Architecture



Component model comparison

- CCM
  - lookup and instantiation of objects on remote hosts
  - marchalling
  - security across mach. bound.
  - IIOP and GIOP
  - Objects handled via object reference
  - Error handling via exceptions
  - Multiple interfaces
  - Necessary services (in CACM):
    - Naming, transactions, events
- EJB
  - invocation of object methods, serialization
  - JRMP/IIOP
  - Server-side beans that process business logic,
  - Single interfaces only
  - Supports transactions
  - RMI = easy to use
  - Not language-independent
  - Better third-party market

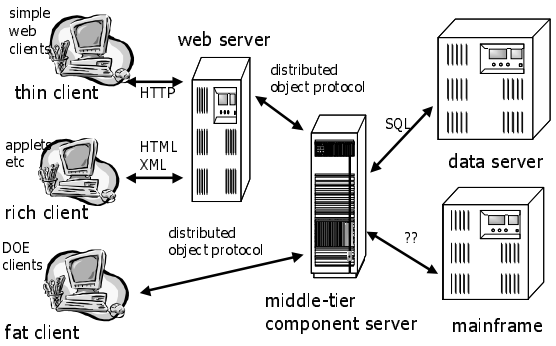
Component container environments

- CCM container managed policies
  - Servant lifetime
  - Transaction: flat, operation level
  - Security
  - Notification/events
  - persistence
- EJB container manages
  - Component lifecycle, resource pooling, load balancing
- EJB component descriptor
  - Persistence
  - Transaction
  - security

Usability comparison

- why multi-tier architecture?
- flexibility
  - middle-tier business services accessible by many different types of clients
- scalability
  - Optimization of resource sharing in middle-tier
- Robustness
  - Interchangeable servers deliver business services

- A comparison framework



	COM+	EJB	CCM
scalability	****	****	****
ease of development	****	****	***?
security	****	****	****
state management	no container-managed persistence	****	****
deployment	***	**	****
robustness	***	product based	**?
platform support	**	****	?

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