Hardware and Software

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Java COMPATIBLE ENTERPRISE EDITION

The Java EE 7 Platform: Developing for the Cloud

Adam Leftik, Java EE and GlassFish Product Management

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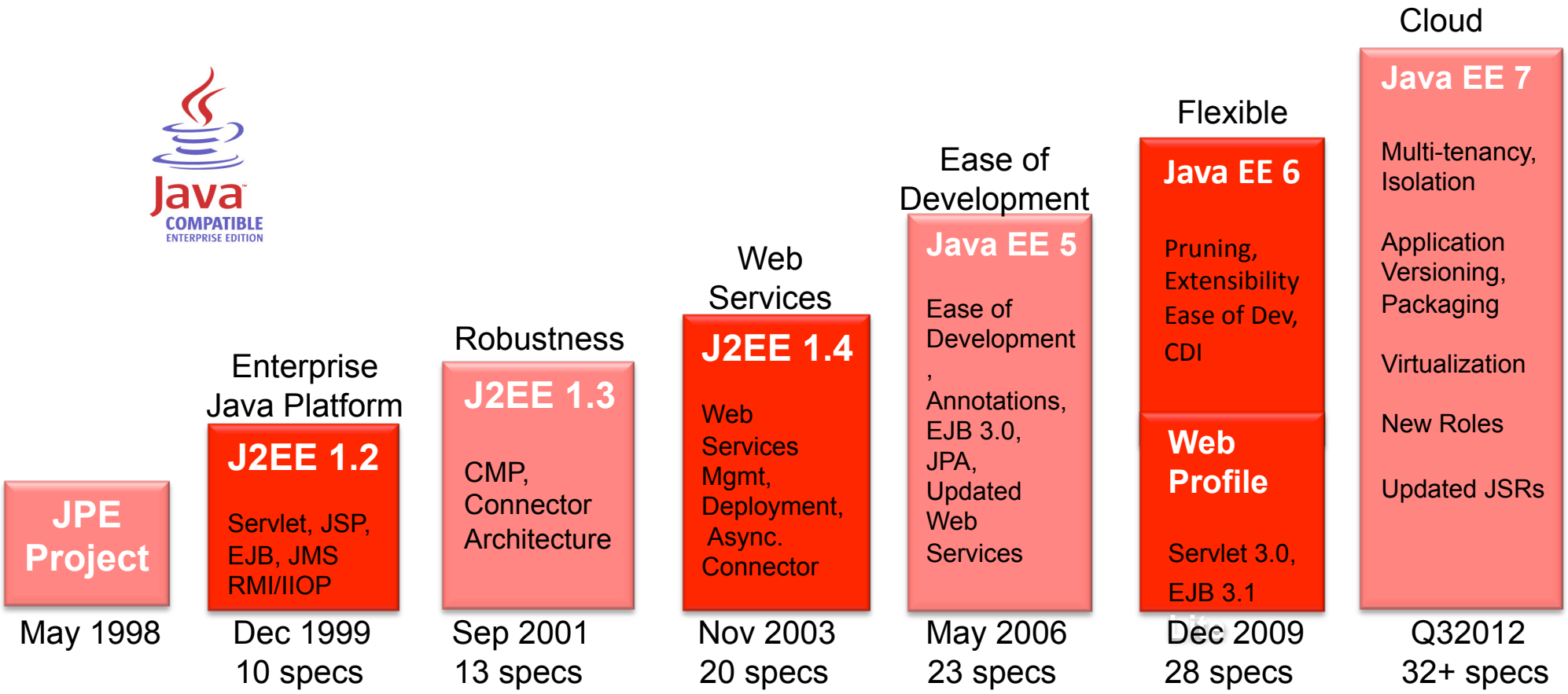
Java EE Roadmap

Java EE Past, Present, & Future



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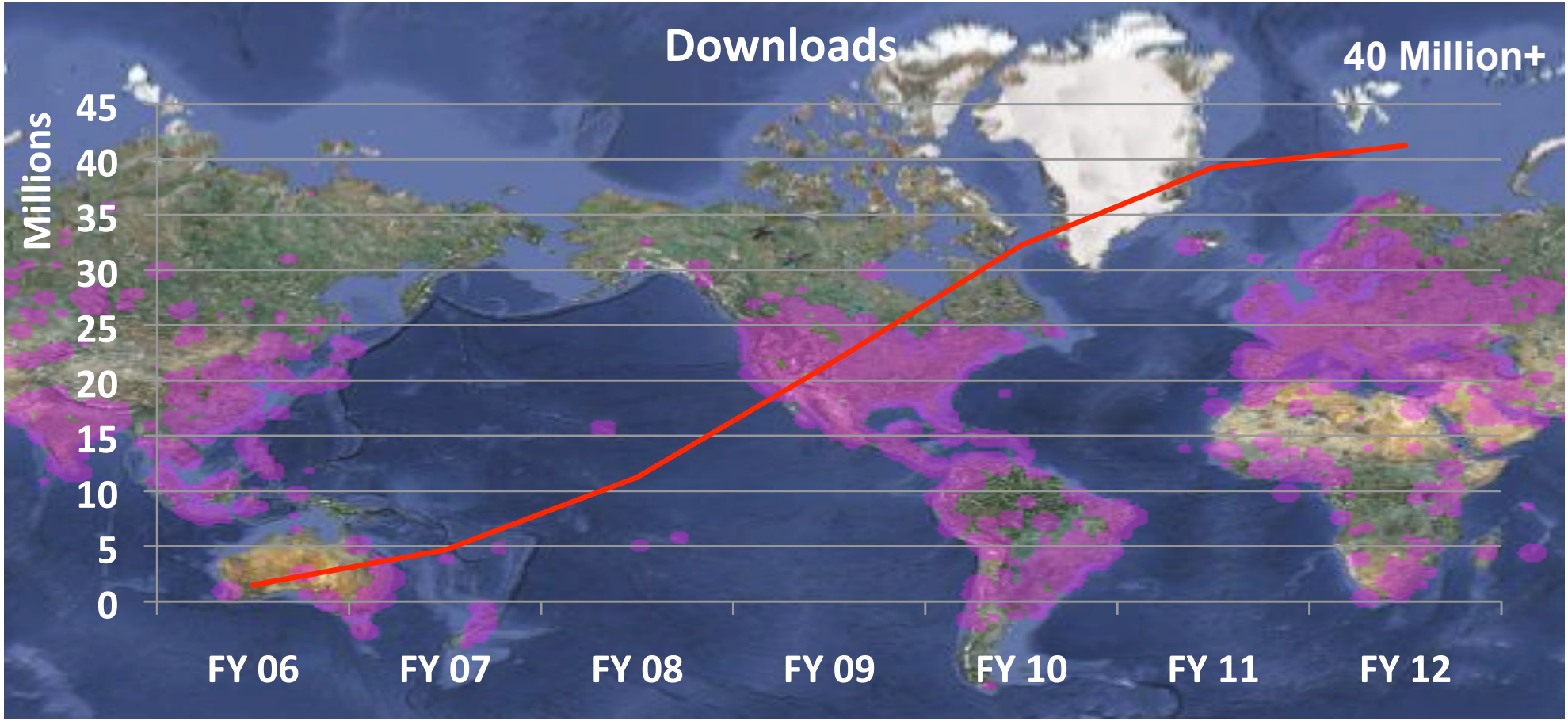
Java EE – Developer Adoption



Today's Cloud Offerings Are Vendor-Specific

Infrastructure as a Service

Platform as a Service

Software as a Service

. . .

Java EE 7 Focus: Platform as a Service

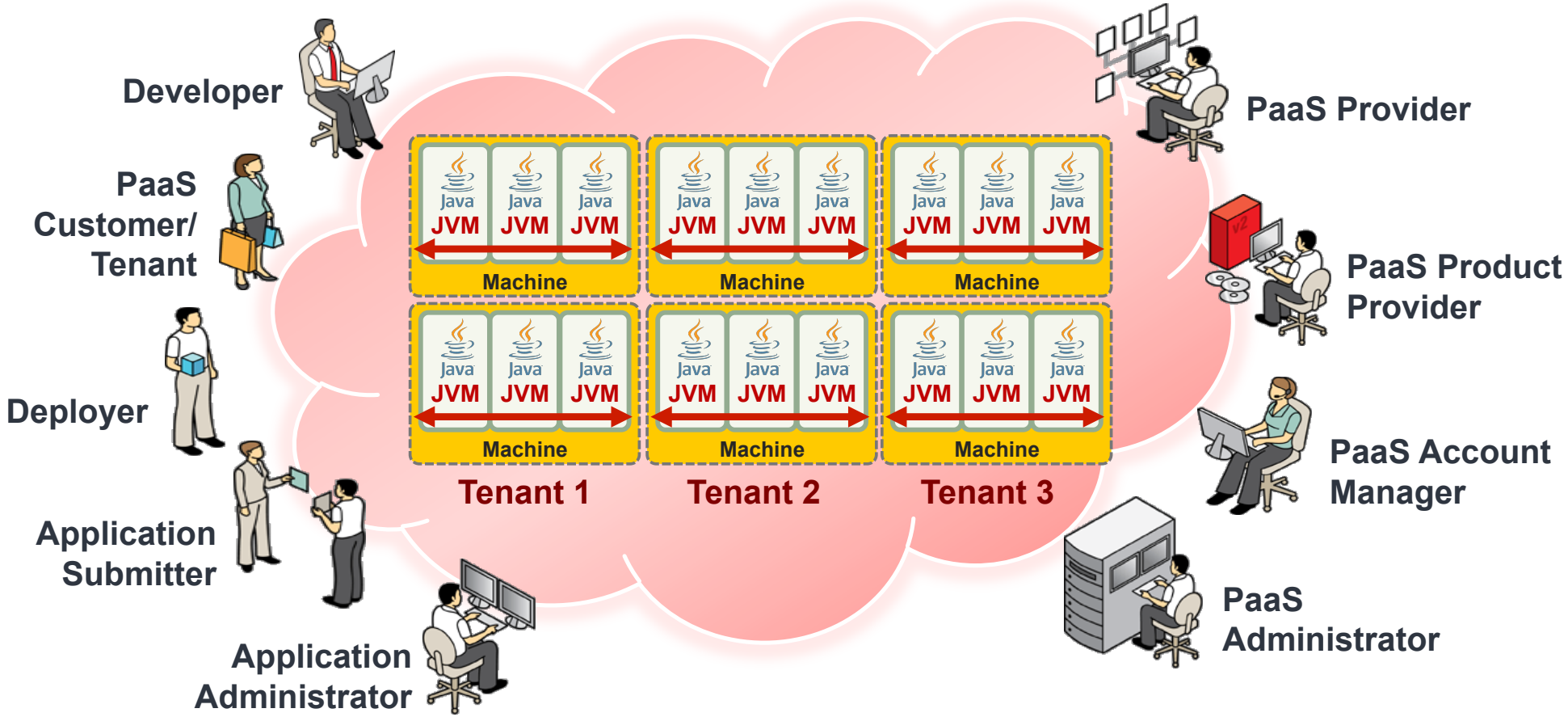
- Provide way for customers and users to leverage public, private, and hybrid clouds
- PaaS support entails evolutionary change
- Next logical step for Java EE
  - J2EE → Java EE 6 : The Java EE Platform provides services
  - Java EE 7 : The Java EE Platform IS a service

Java EE 7 PaaS Roadmap

- Define new platform roles to accommodate PaaS model
- Add metadata
  - For service provisioning and configuration
  - For QoS, elasticity
  - For sharing of applications and resources
  - For (re)configurability and customization
- Add useful APIs for cloud environment
  - JAX-RS client API, Caching API, State Management, JSON,…
- Extend existing APIs with support for multi-tenancy

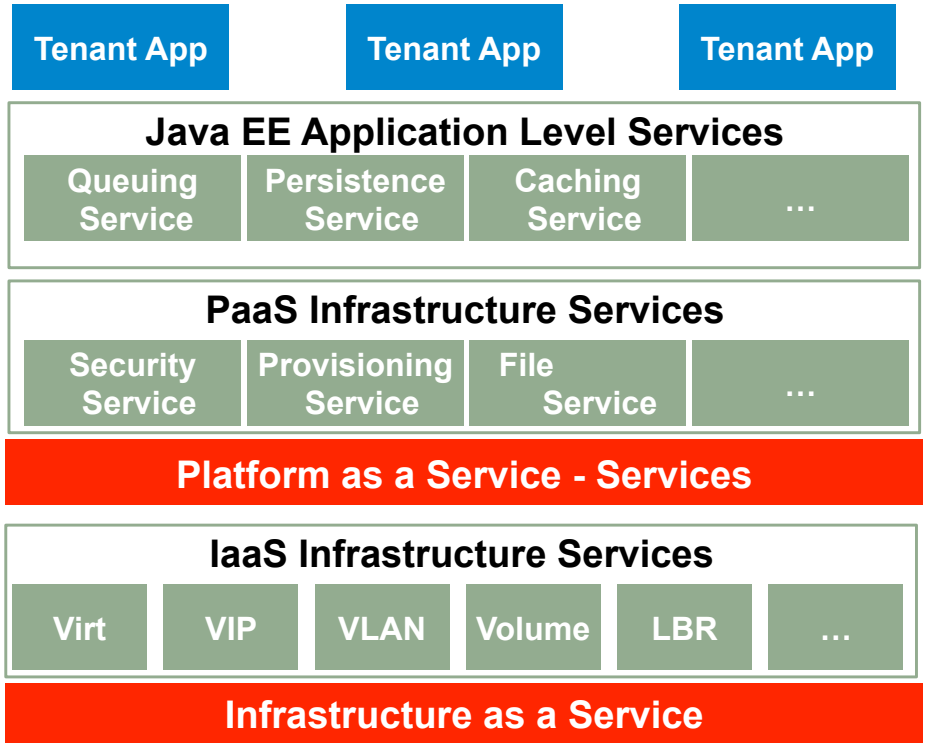
Java EE Platform Focus Areas

Roles



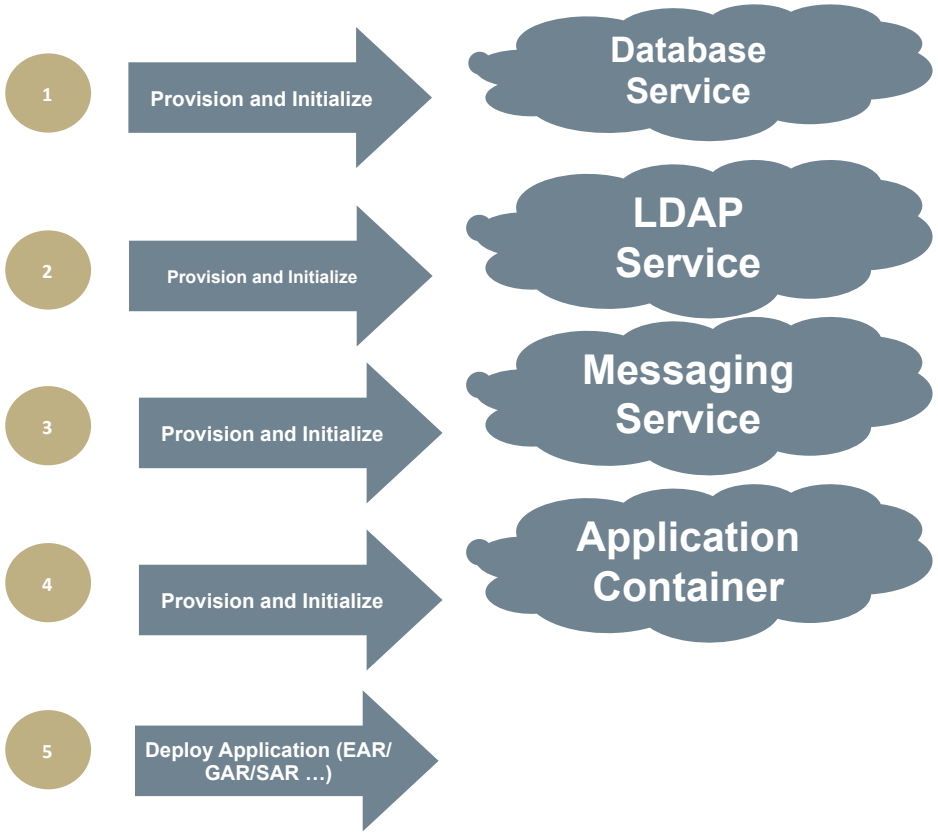
Java EE 7 Focus Area: Cloud Services, Not Just APIs

- In the cloud tenant applications consume services
- PaaS administrators host, configure, and manage application and infrastructure services
- Existing APIs in Java EE need to be updated to be service-enabled and tenant-aware
  - Example: pluggable services, late binding and tenant id injection



Old Java EE model

- Configure Java EE resources – JDBC, JMS etc
- Deploy Application EAR



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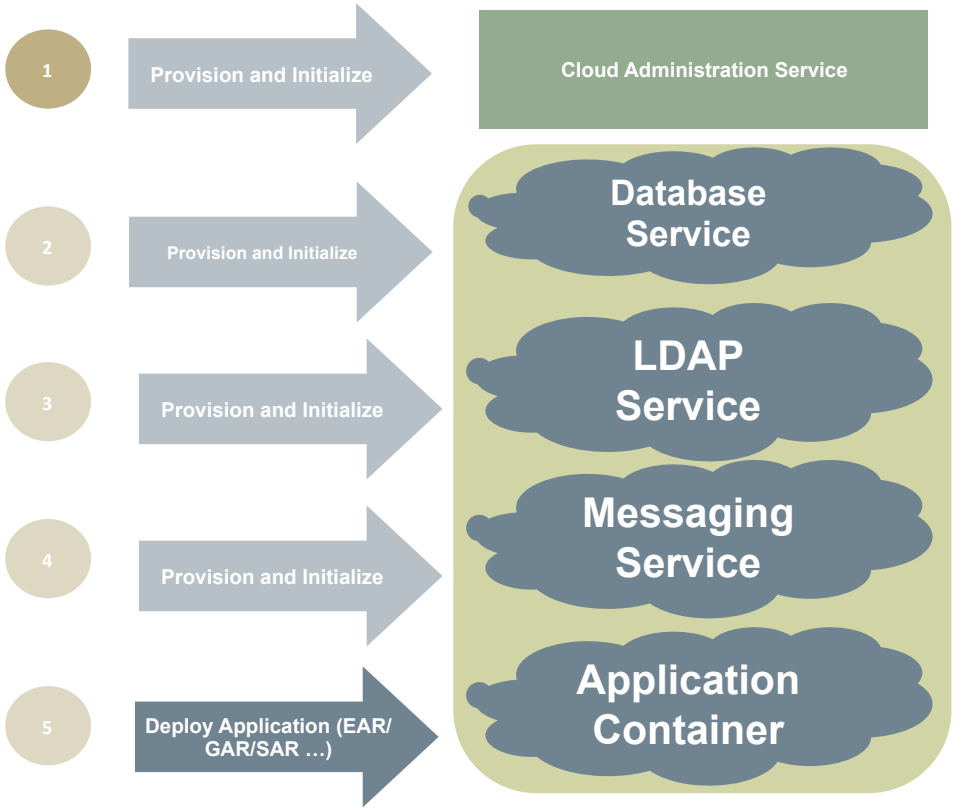
Java EE 7 Model: Auto-Provision Services from Application Dependencies

- Provision and deploy application resources (e.g. LDAP stripe, data source instantiation and connection …)
- Extensible Deployment Models Supporting Multiple Frameworks
  - Spring, Seam, Play …



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Services

- Cloud apps consume services
  - Persistence, queueing, mail, caching, …
- Service metadata facilitates ease of use when deploying into the cloud

```
@DataSourceDefinition(
    name="java:app/jdbc/myDB",
    className="oracle.jdbc.pool.OracleDataSource",
    isolationLevel=TRANSACTION_REPEATABLE_READ,
    initialPoolSize=5
)
```

Services

- Cloud apps consume services
  - Persistence, queueing, mail, caching, …
- Service metadata facilitates ease of use when deploying into the cloud

```
@JMSConnectionFactory (
   name="java:app/myJMSConnectionFactory",
   resourceType="javax.jms.QueueConnectionFactory")

@JMSDestination(
   name="java:app/myQueue",
   resourceType="javax.jms.Queue")
```

Services

- Cloud apps consume services
  - Persistence, queueing, mail, caching, …
- Service metadata facilitates ease of use when deploying into the cloud

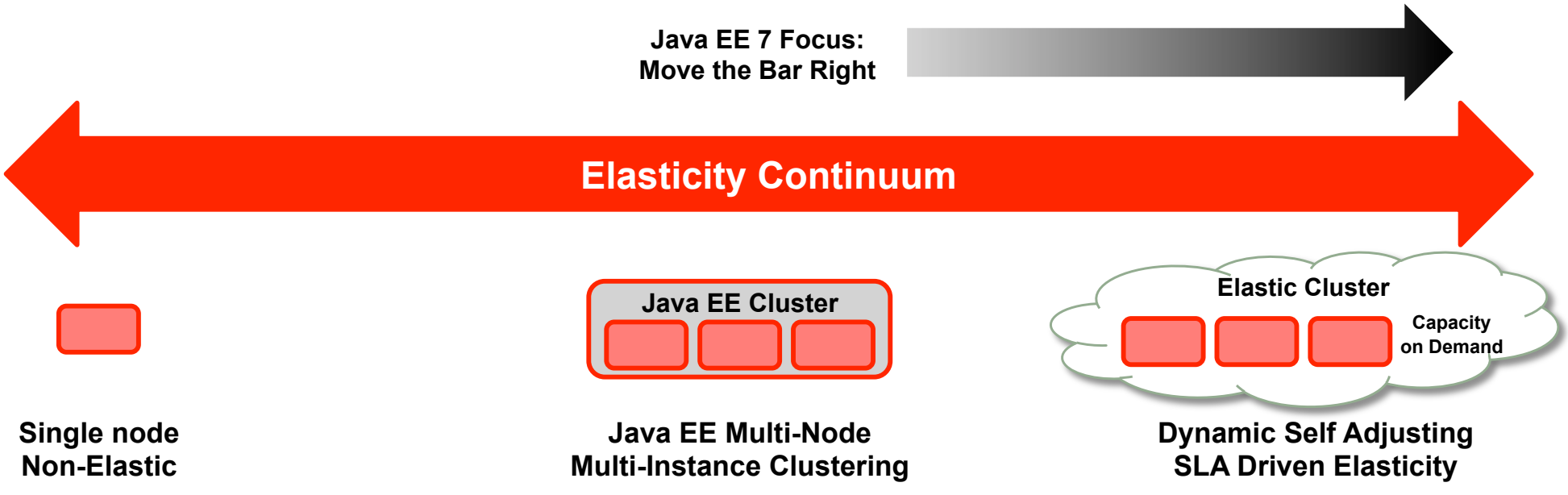
```
@MailSession (
    name="java:app/mailSession",
    from="MyService@ExtraServices.com"
)
```

Services

- Cloud apps consume services
  - Persistence, queueing, mail, caching, …
- Service metadata facilitates ease of use when deploying into the cloud

```
@ConnectorService (
    name="java:app/myCustomConnector",
    type="com.extraServices.customConnector.class",
    properties = {…}
)
```

Elasticity



- Capacity On Demand
- Autonomic Service Level Management
- Targeting deployment from single machine to IaaS

DEMO

PaaSing a Java EE Application in the Cloud

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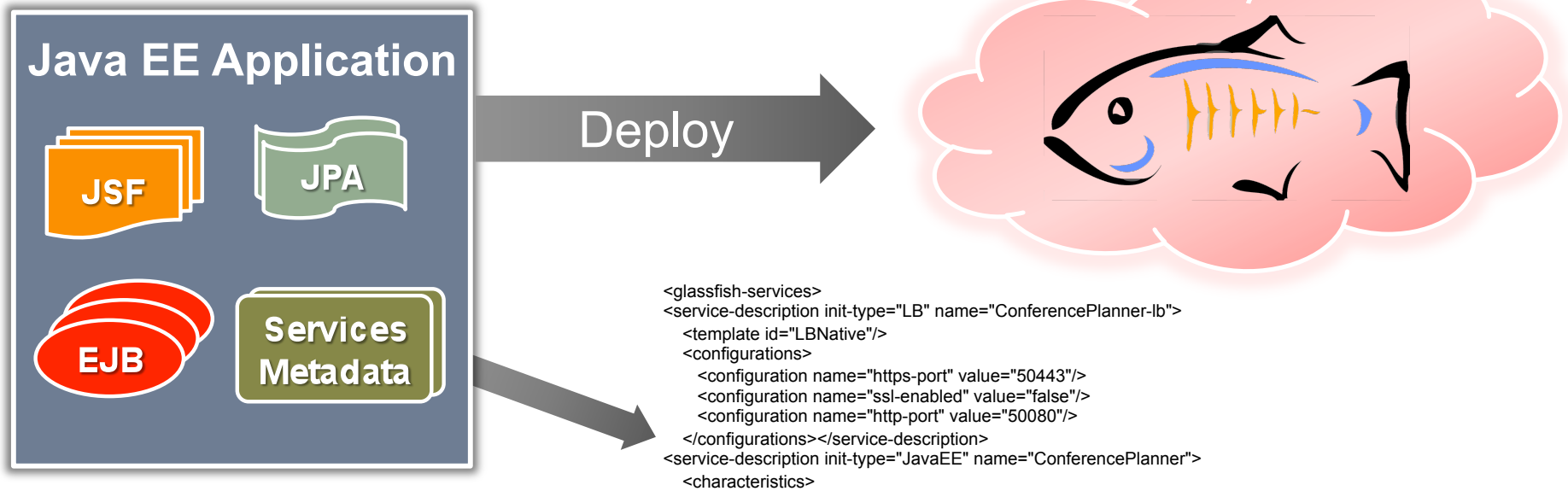
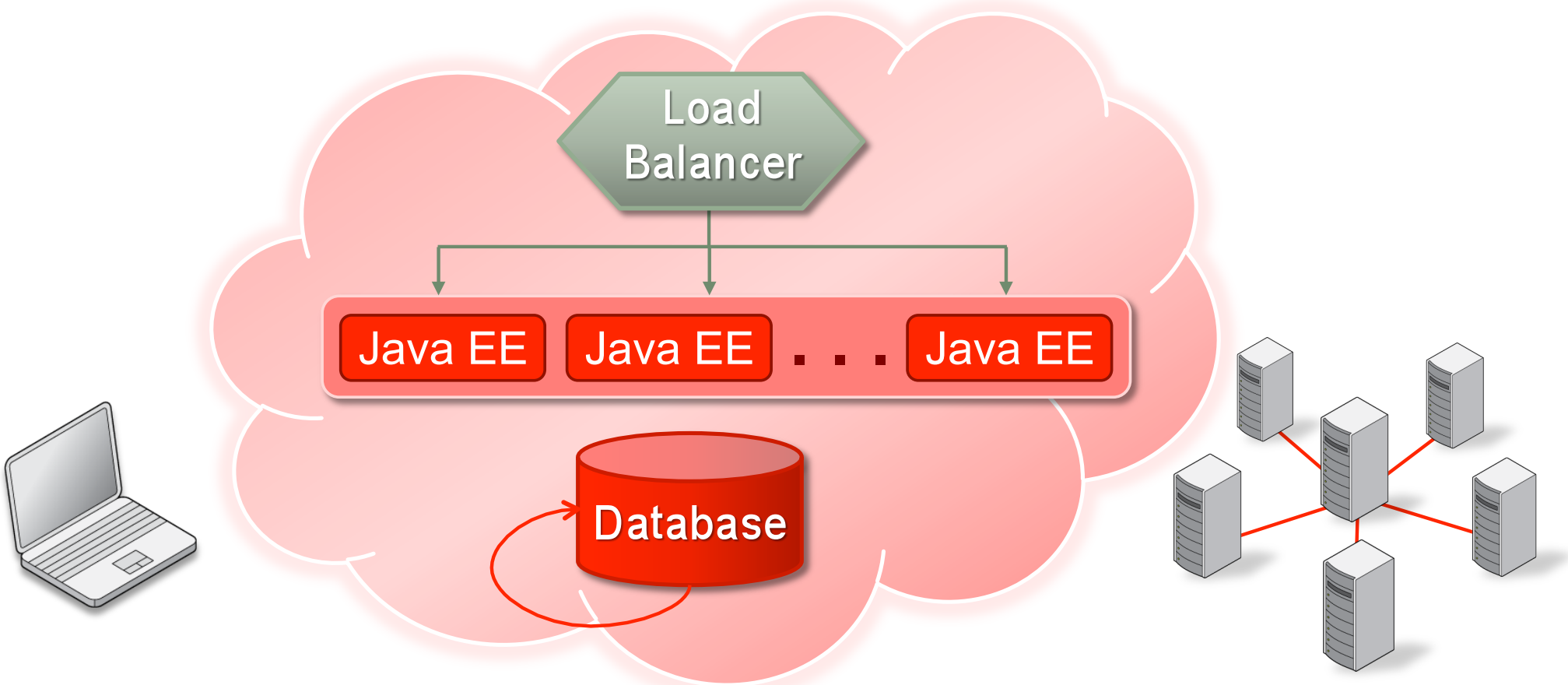
Conference Planning in the Cloud




```
<glassfish-services>
<service-description init-type="LB" name="ConferencePlanner-lb">
   <template id="LBNative"/>
   <configurations>
      <configuration name="https-port" value="50443"/>
      <configuration name="ssl-enabled" value="false"/>
      <configuration name="http-port" value="50080"/>
   </configurations></service-description>
<service-description init-type="JavaEE" name="ConferencePlanner">
   <characteristics>
      <characteristic name="service-type" value="JavaEE"/>
   </characteristics>
   <configurations>
      <configuration name="max.clustersize" value="4"/>
      <configuration name="min.clustersize" value="2"/>
   </configurations>
</service-description>
. . .
</glassfish-services>
```

http://glassfish.org/javaone2011

Service Provisioning



Multi-tenancy in Java EE 7

- Support for separate isolated instances of the same app for different tenants
  - One application instance per tenant
  - Tenants correspond to units of isolation
  - Multitenant apps are declared as such
  - Each instance customized and deployed for a single tenant
  - Limited form of SaaS
- Mapping to tenant done by the container
- Tenant id available to application
  - E.g., under java:comp/tenantId or by injection

Java EE 7 Focus Area: Application Level Multi Tenancy

- Goal: Simple configuration
- Flexible tenant discriminator support
- Other areas impacted - JNDI, JMS, EJB …

```
@Entity
@Table(name="EMP")
@MultiTenant(SINGLE_TABLE)
@TenantDiscriminator(name="company-id", columnName="COMPANY")
public class Employee {
```

EMP

EMP_ID	VERSION	F_NAME	L_NAME	GENDER	DEPT_ID
1	1	John	Doe	M	1
2	3	Jane	Doe	F	2

depart_id → DEPT_ID

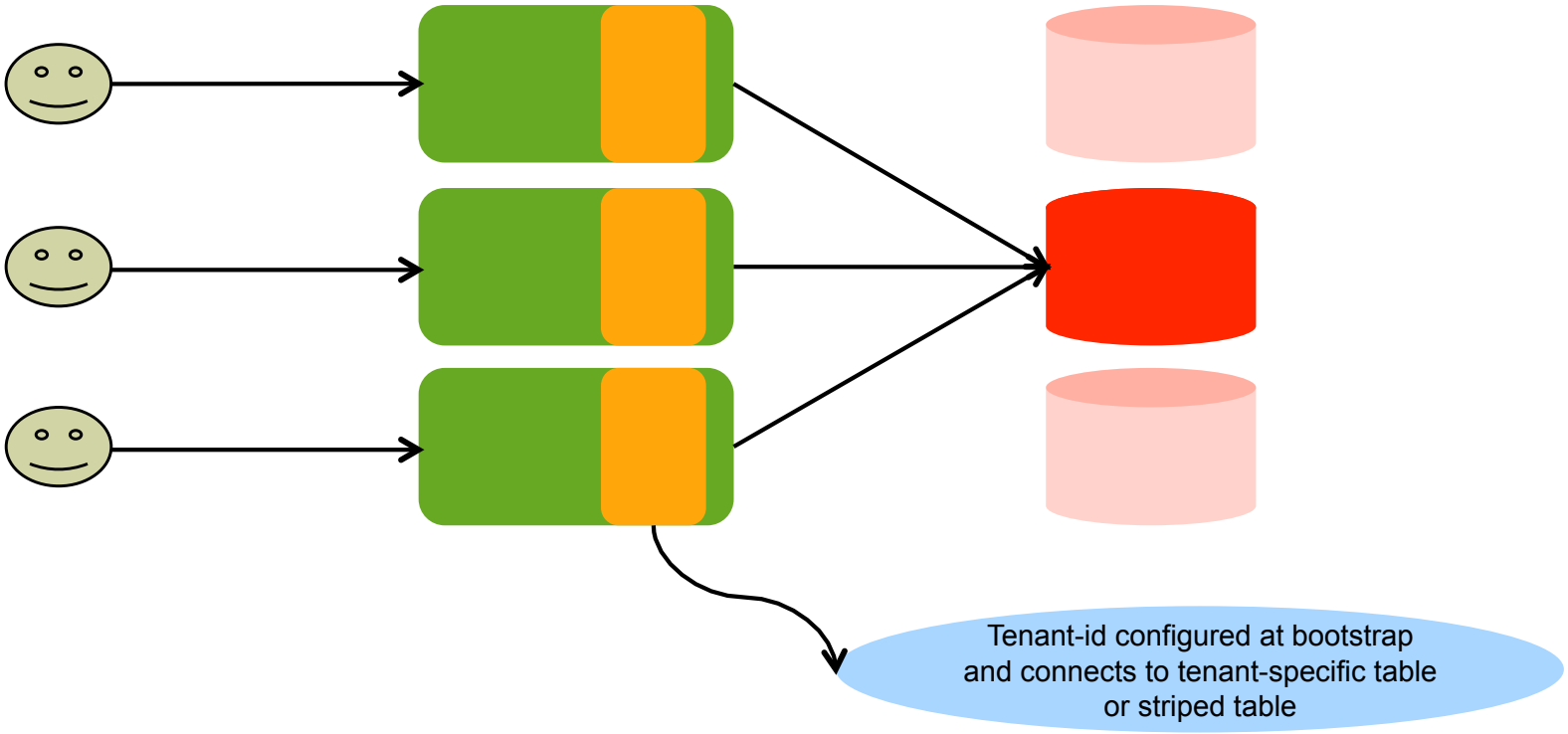
```
SELECT * FROM EMPLOYEE WHERE L_NAME LIKE 'D%' AND DEPT_ID= 1
```

Persistence Layer

- Multi-tenant Taxonomies
- Dedicated App, Dedicated Database
- Shared App, Dedicated Database
- Dedicated App, Shared Database
- Shared App, Shared Database

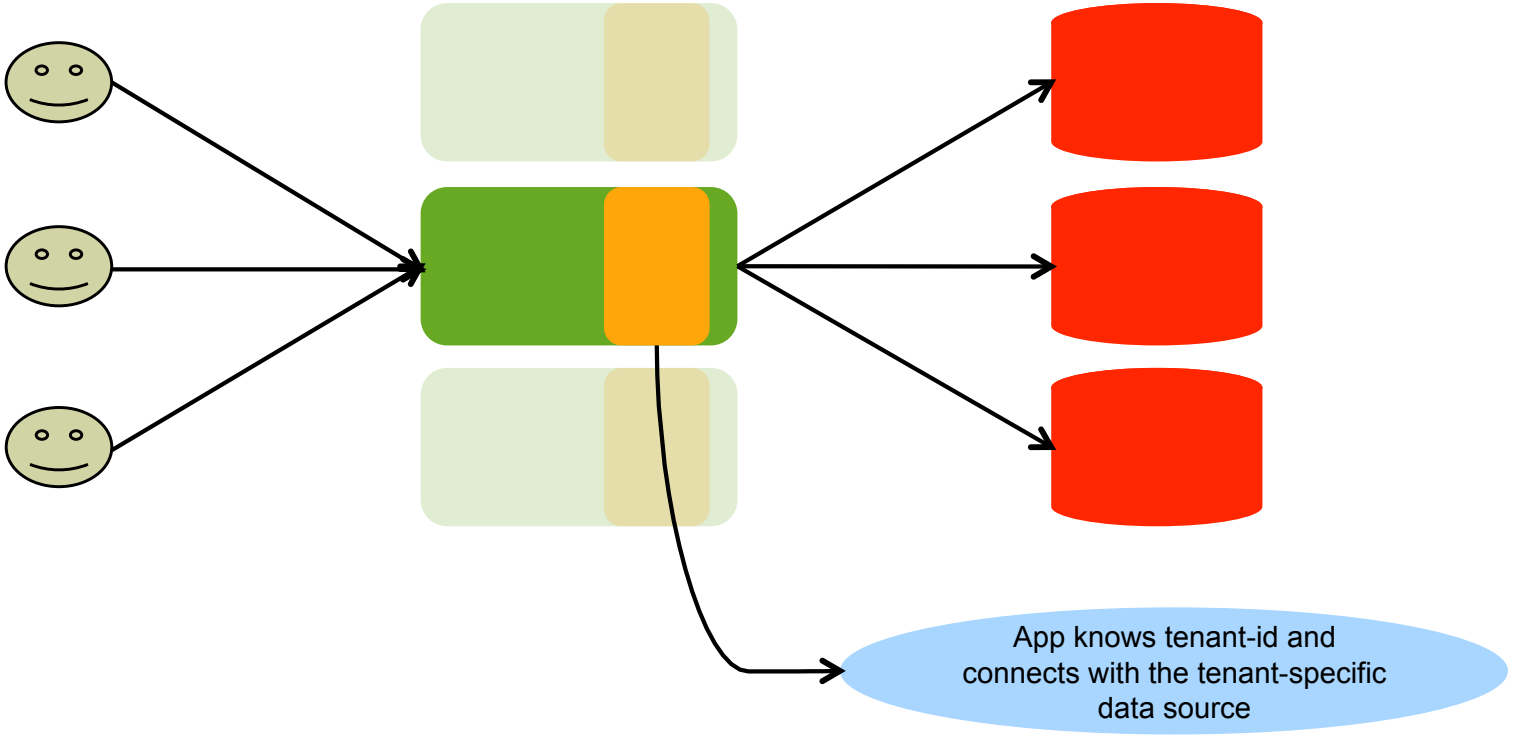
Dedicated App, Shared Database

- Persistence Layer Multi-Tenant Taxonomies



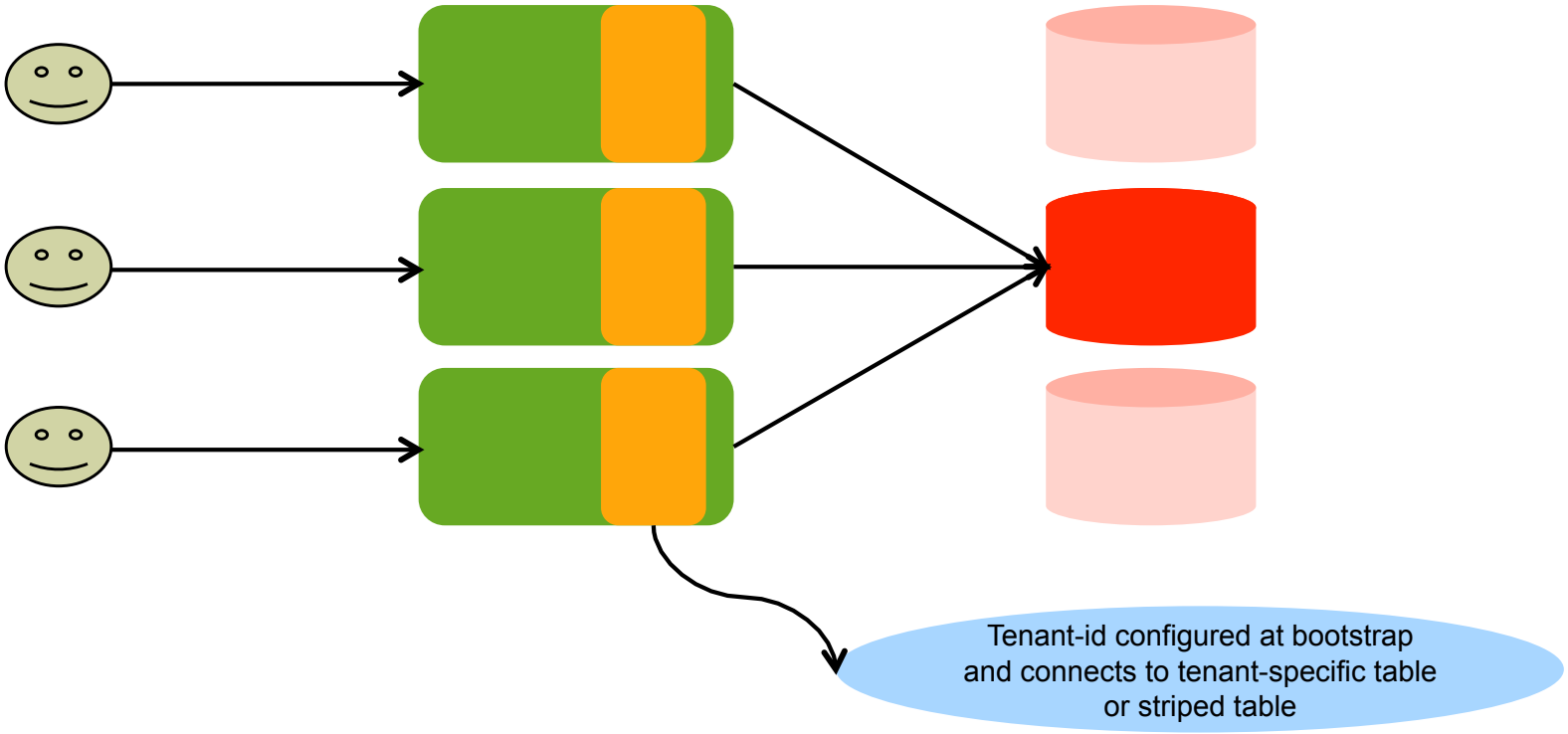
Shared App, Dedicated Database

- Persistence Layer Multi-Tenant Taxonomies



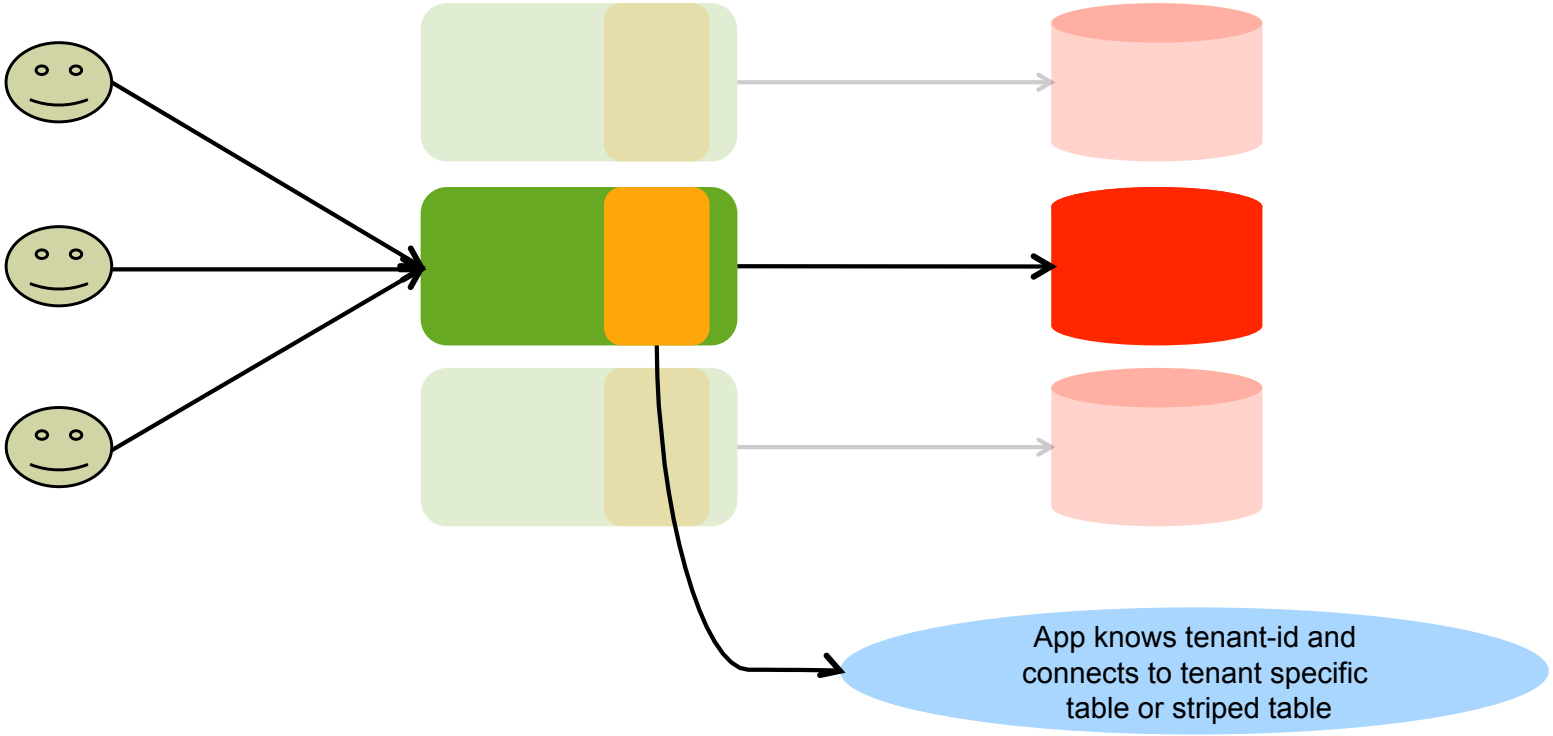
Dedicated App, Shared Database

- Persistence Layer Multi-Tenant Taxonomies



Shared App, Shared Database

- Persistence Layer Multi-Tenant Taxonomies



Java EE 7 Is Not Just PaaS Focused

- Alignment of ManagedBeans across CDI, EJB, JSF,…
  - POJO → ManagedBean → Enterprise JavaBean
  - Extension of container-managed transactions beyond EJB
- Further simplifications for ease-of-development
  - JMS 2.0 focus on ease-of-development
  - Expanded use of dependency injection
  - Expanded service metadata; improved configuration
- Pruning
  - EJB CMP and BMP, JAX-RPC, Deployment API
- Update to Web Profile

Java EE 7 By JSR

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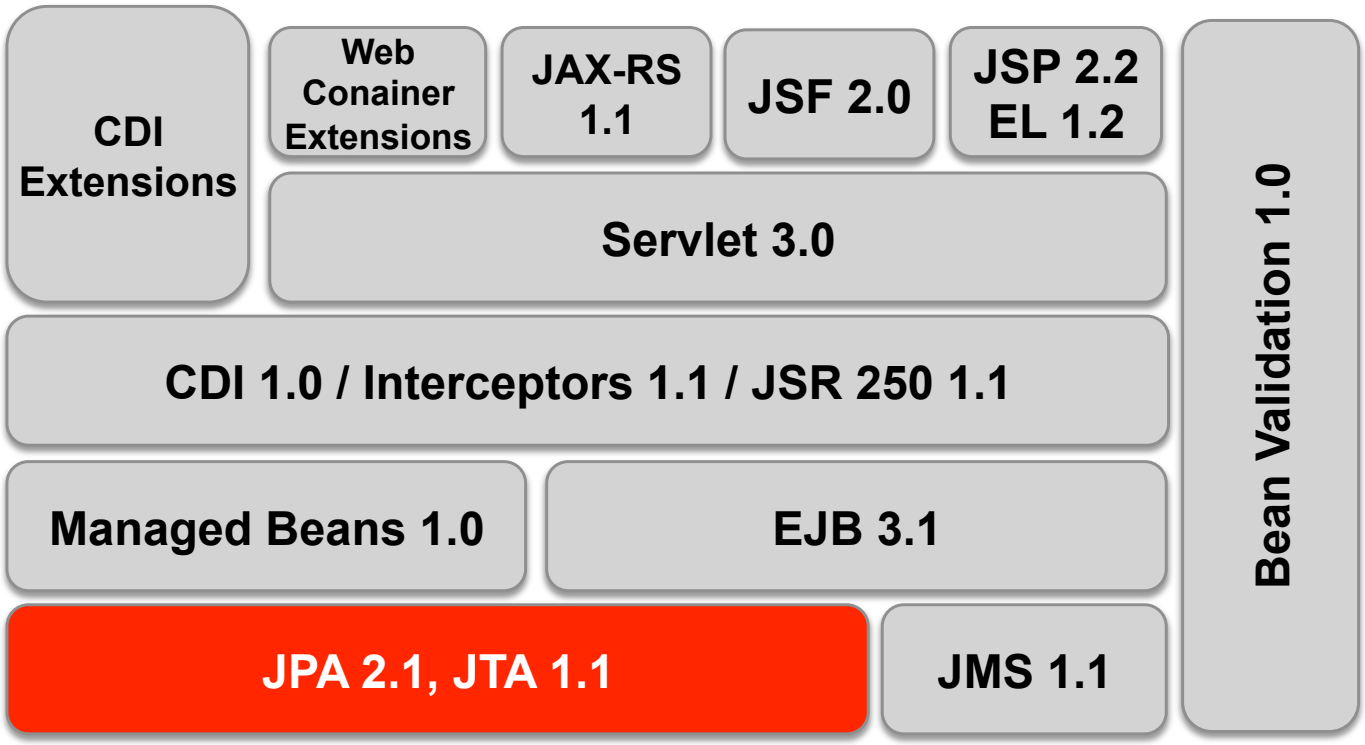
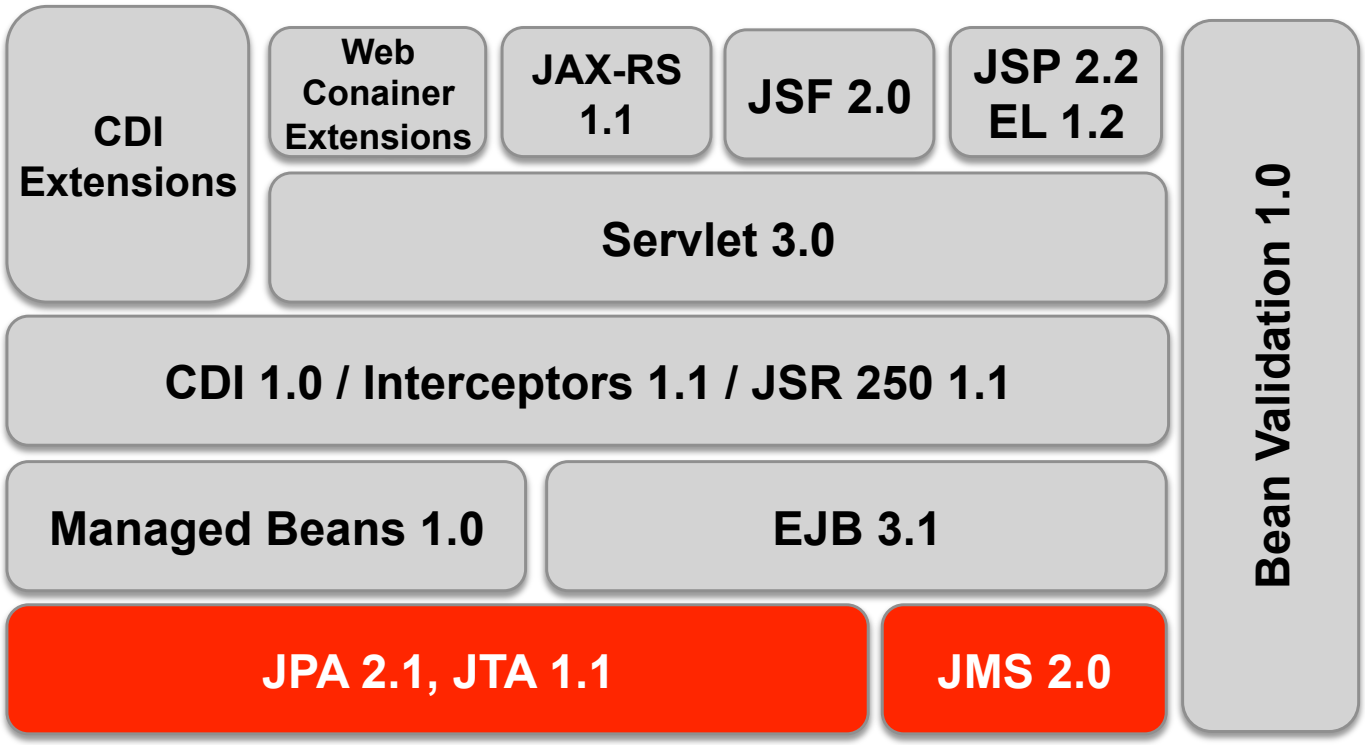
Java EE 7 – JPA 2.1 (JSR 338)



JPA 2.1

- Multi-Tenancy
- Stored Procedures
- Query by Example
- Dynamic PU Definition
- Schema Generation

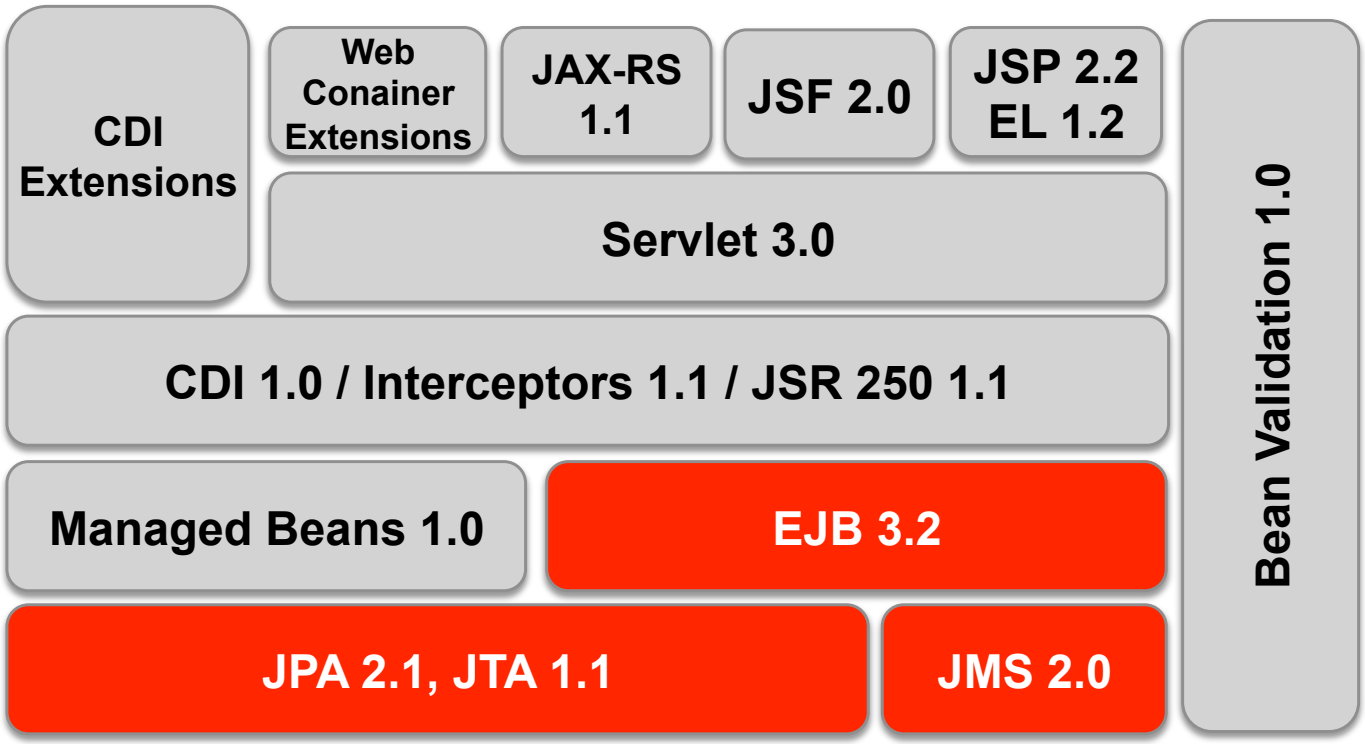
Java EE 7 – JMS 2.0 (JSR 343)



JMS 2.0

- 9 years since last update
- Modest scope
- Ease of development
- Pluggable JMS provider
- Extensions to support “Cloud”

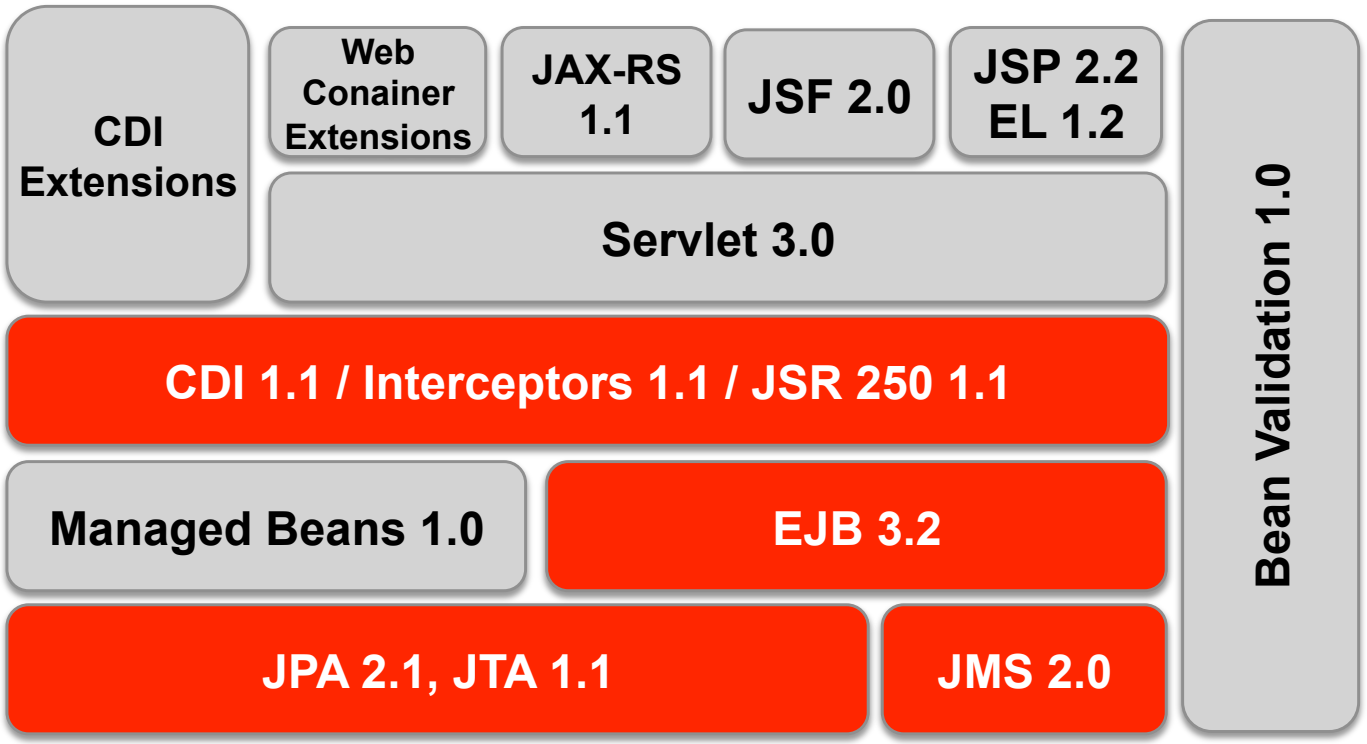
Java EE 7 – EJB 3.2 (JSR 345)



EJB 3.2

- Incremental factorization
- More annotations
- Optional
  - BMP/CMP
  - Web Svcs invocation using RPC

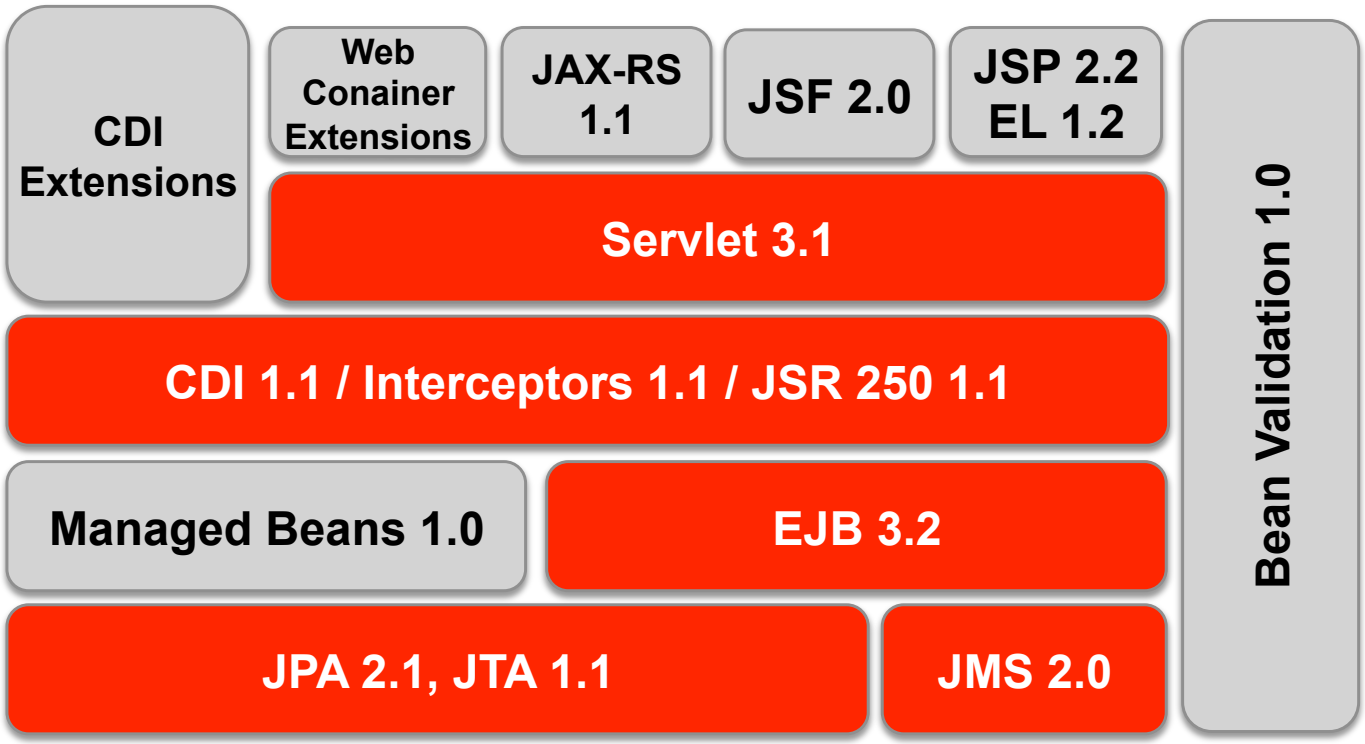
Java EE 7 – CDI 1.1(JSR 346)



CDI 1.1

- Embedded mode
- Lifecycle Events
- Declarative package scanning
- Global ordering of interceptors and decorators
- Injection Static Variables

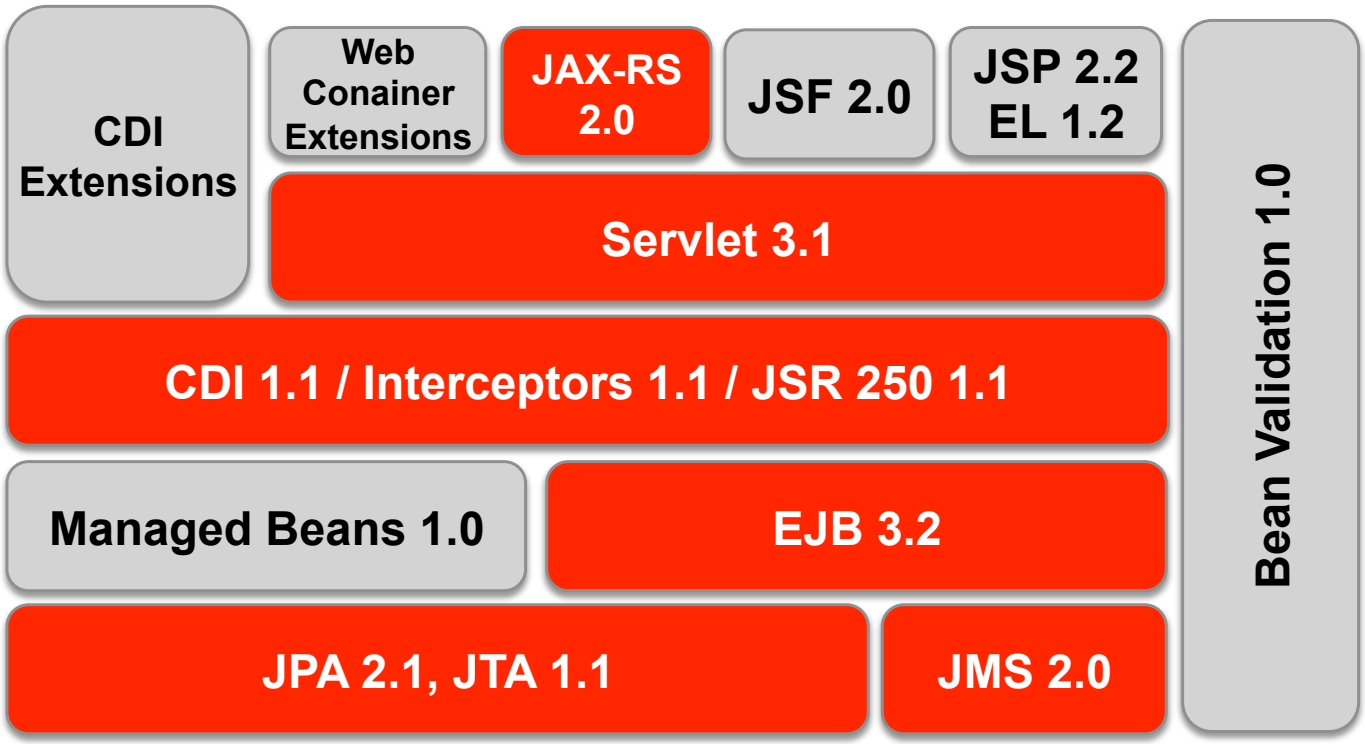
Java EE 7 - Servlet 3.1 (JSR 340)



Servlet 3.1

- NIO.2 Async I/O
- Leverage Java EE concurrency
- Web Sockets support
- Ease of Use

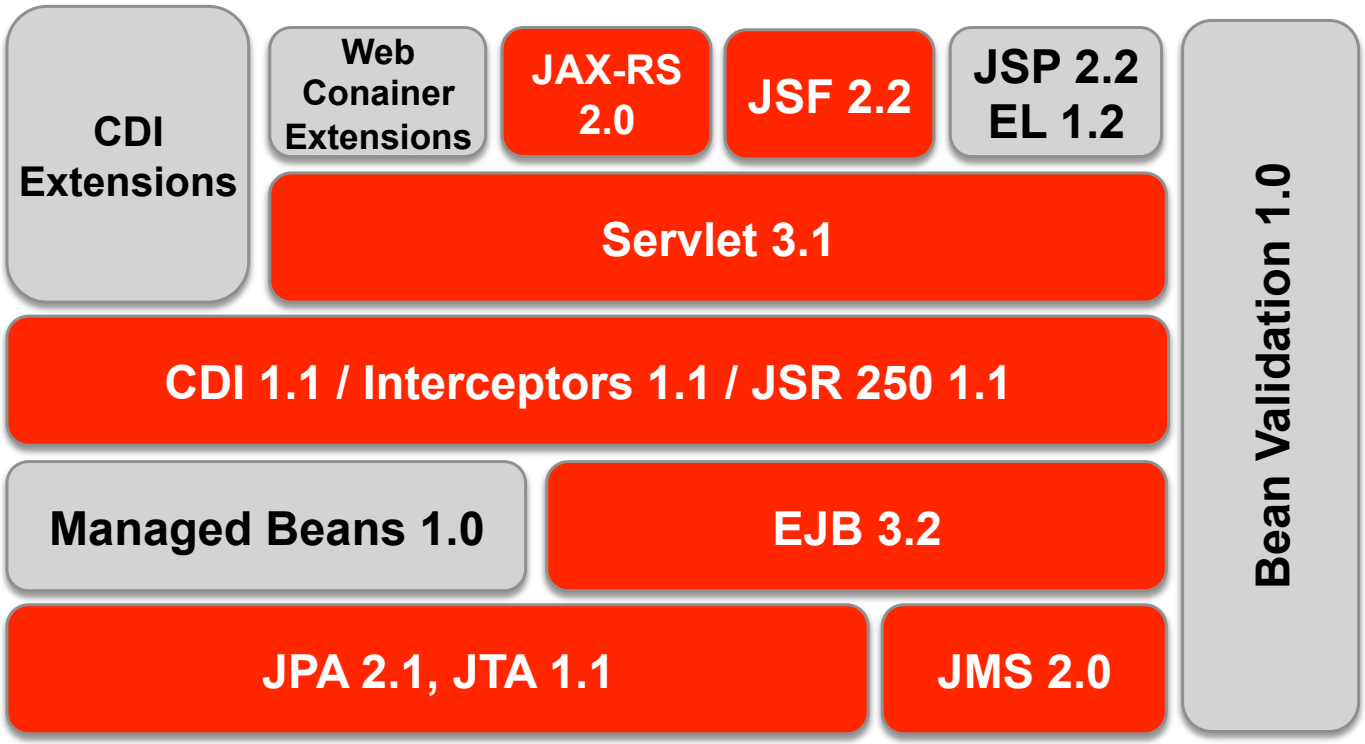
Java EE 7 – JAX-RS 2.0 (JSR 339)



JAX-RS 2.0

- Client API
- Hypermedia
- Bean Validation

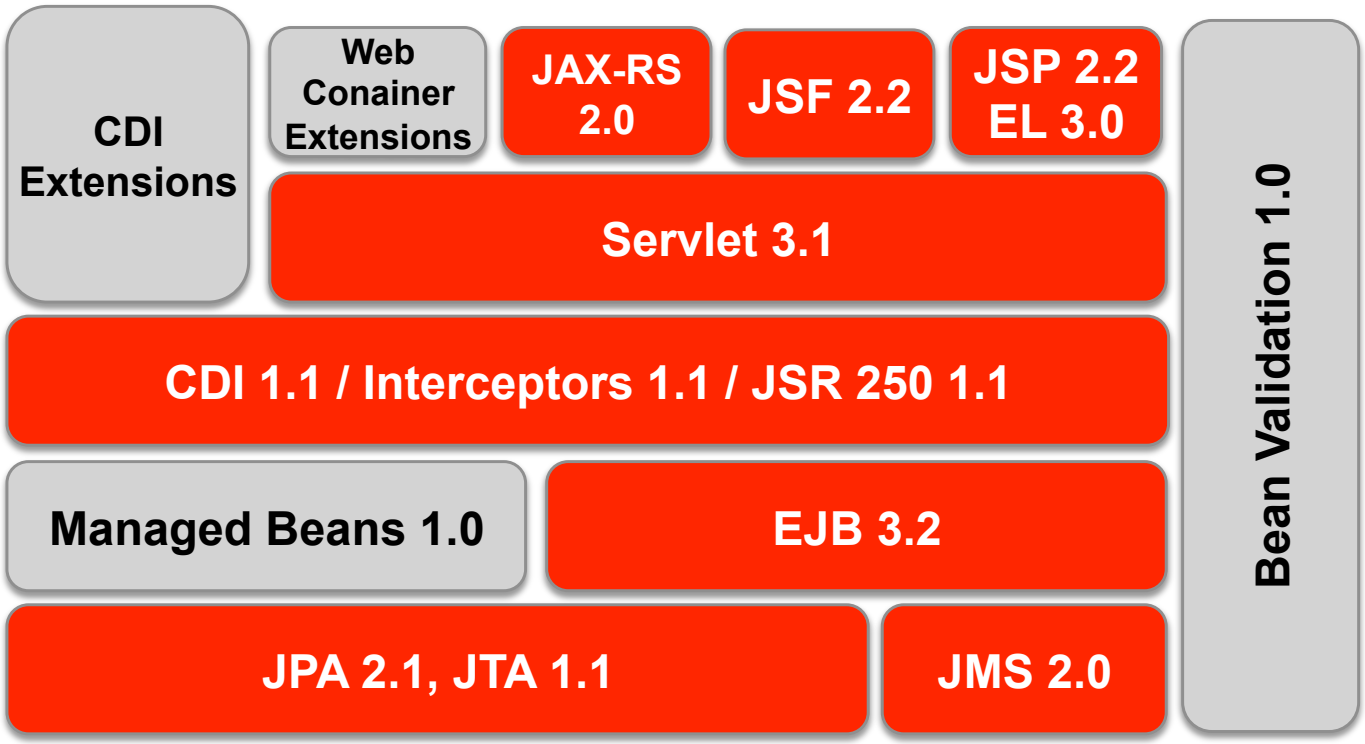
Java EE 7 – JSF 2.2 (JSR 344)



JSF 2.0

- Ease of development
- HTML 5 support
- New components
- Portlet Integration

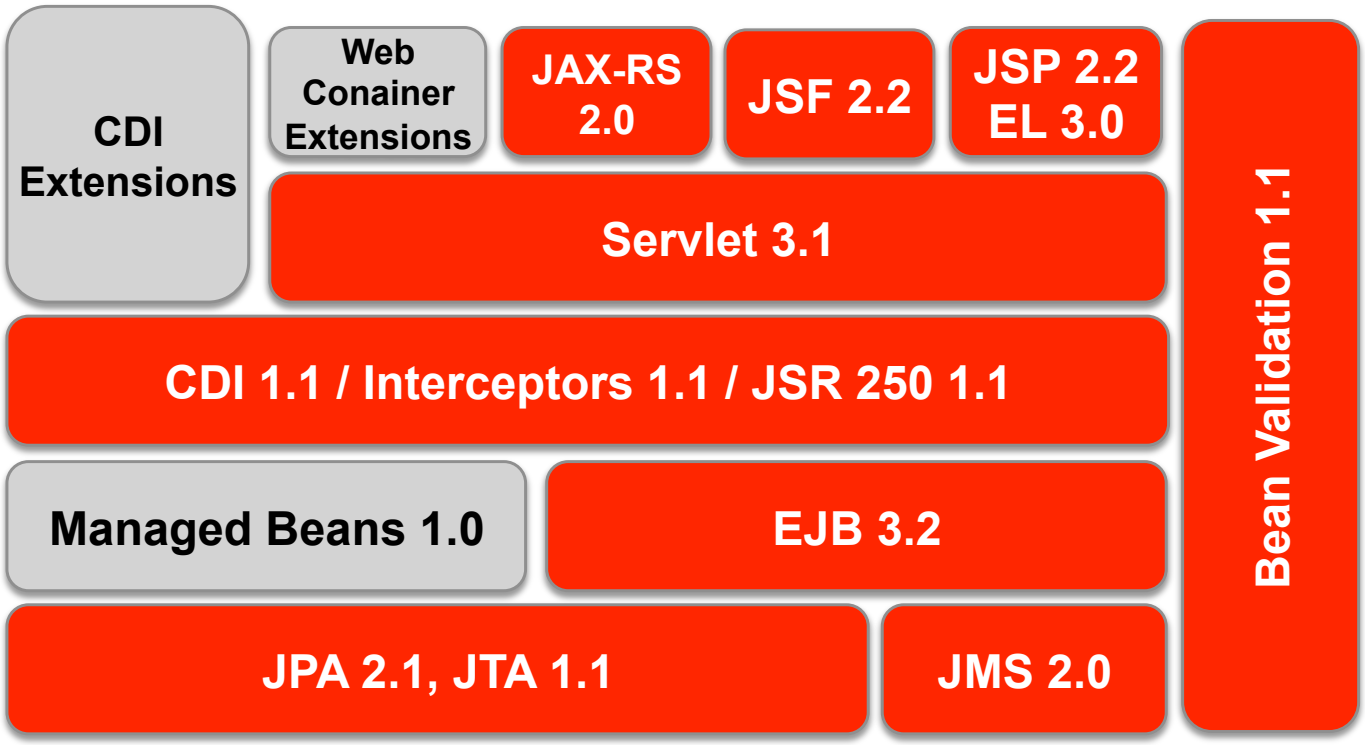
Java EE 7 – Expression Language 3.0 (JSR 341)



EL 3.0

- Standalone JSR
- Easier to use outside container
- Criteria-based Collection selection
- New operators
- CDI events for expression eval

Java EE 7 – Bean Validation 1.1 (JSR 349)



Bean Validation 1.1

- Integration with other JSRs (JAX-RS, JAXB, JPA)
- Method-level validation
- Compound Expressions

Transparency

- Our Java EE 7 JSRs are run in the open on java.net
  - http://javaee-spec.java.net
  - One project per spec – e.g., jpa-spec, jax-rs-spec, jms-spec…
- Publicly viewable Expert Group mail archive
  - Users observer list gets copies of all Expert Group emails
- Publicly viewable download area
- Publicly viewable issue tracker
- Commitment to match JCP 2.8 Process

Status and Schedule

- Nearly all JSRs up and running
- Remaining ones to be filed in next few weeks
- Final release target: Q3 2012
- Date-driven release: anything not ready will be deferred to Java EE 8

How to Get in the Loop

- Java EE 7 Expert Group Project
  - http://javaee-spec.java.net
- Java EE 7 Reference Implementation
  - http://glassfish.org
- The Aquarium
  - http://blogs.oracle.com/theaquarium

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