

A photograph of the Arizona State Capitol building, a large neoclassical structure with a prominent dome. In the foreground, there is a statue of a man on a pedestal, with other smaller statues nearby. The scene is set outdoors with trees and a clear sky.

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The background of the slide is an aerial photograph of a large, circular architectural structure, possibly a dome or a large hall. The structure features a complex, repeating pattern of octagonal and hexagonal recessed areas. In the center of the structure is a large, circular opening. Within this opening is a dark blue, five-pointed star. The star has the letters 'T', 'E', 'A', and 'S' positioned near its points. A semi-transparent blue horizontal band is overlaid across the middle of the image, serving as a background for the title text.

Apache Karaf

for the Enterprise



Apache Karaf ?

OSGi ?

- OSGi:
 - Modular and dynamic
 - OSGi Bundles
 - Classloading (one classloader/bundle)
 - Lifecycle
 - Reuse code/low coupling (package import/export)
 - Multi-Versioning support
 - SOA (Service Registry and service dynamism)
 - Provided by a OSGi framework (Apache Felix)

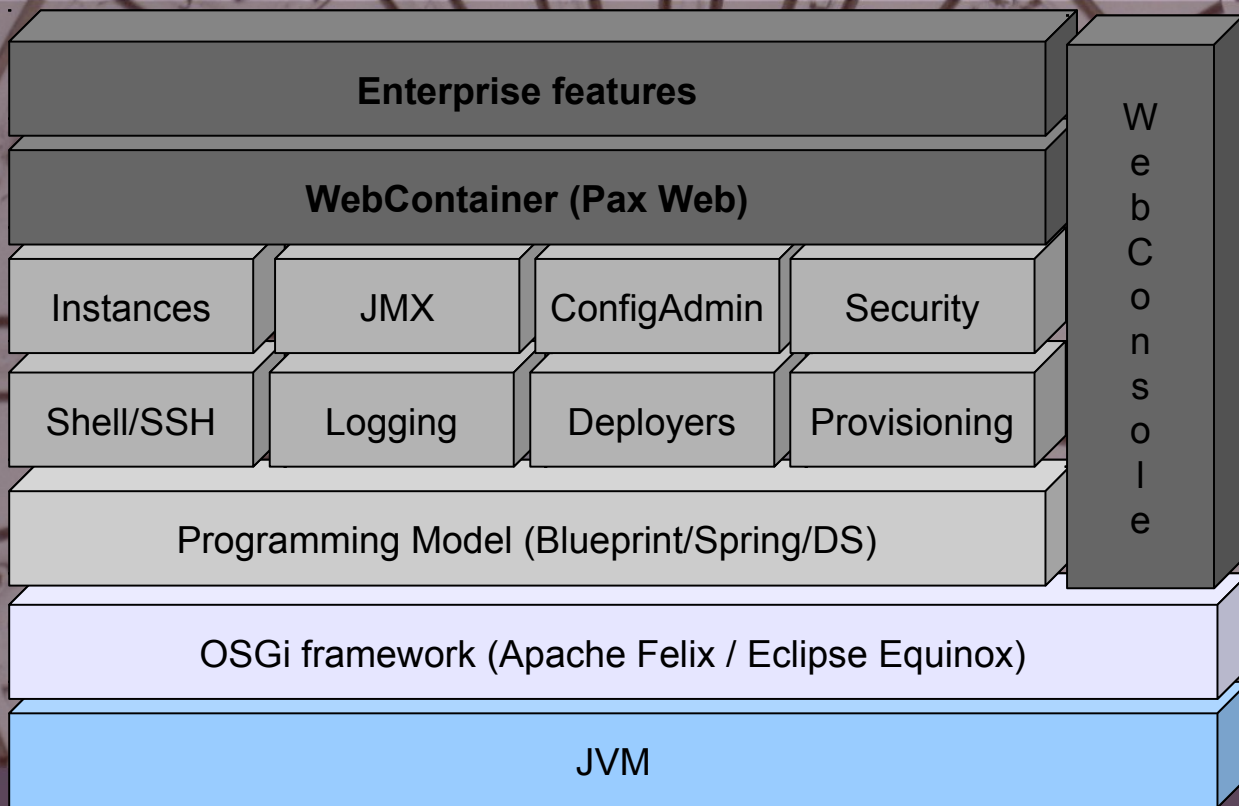


Apache Karaf ?

- OSGi Container:
 - OSGi and non OSGi applications support
 - Lightweight and modular
 - Allows you to create your own container
 - Ready to use functionalities



Apache Karaf ?



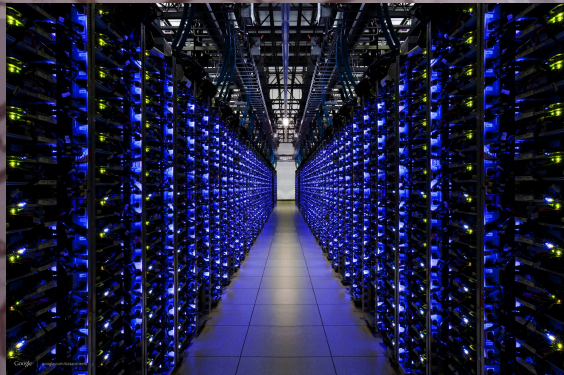


Enterprise Needs

Enterprise Needs

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- Infrastructure needs:
 - Provisioning
 - Monitoring and Management
 - Security
 - Flexible topologies (HA/scalability)
- Development needs:
 - Enterprise Java Specifications support
 - Convenient and standard tools





Karaf and infrastructure needs

Provisioning

- Multiple choices:
 - Create your own container (karaf-maven-plugin)
 - Drop bundles jar/war in the deploy folder (deployer)
 - Install bundles jar/war from the Karaf shell using different protocols (file:, http:, mvn:), leveraging Maven repositories (etc/org.ops4j.pax.url.mvn.cfg)
 - Use Karaf features: XML description of applications and corresponding shell commands
 - Package Karaf features as KAR and drop in the deploy folder (deployer)



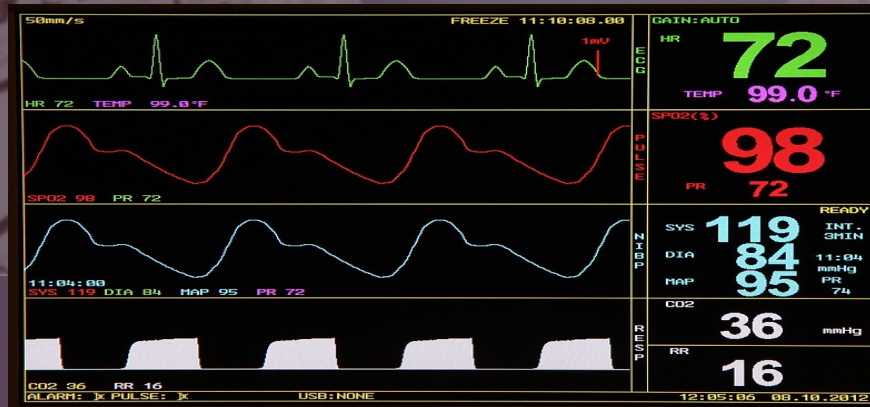
Monitoring/Management

- Complete Unix-like shell console, with remote access (SSH)
- Logging
 - Support most of logging frameworks (slf4j, log4j, commons-logging)
 - Central configuration (etc/org.ops4j.pax.logging.cfg)
 - Dynamic (shell commands)
- JMX layer (etc/org.apache.karaf.management.cfg)
- REST (Jolokia)
- WebConsole (feature:install webconsole)



Monitoring/Management

- Apache Karaf Decanter, complete monitoring platform for Karaf and related (Camel, ActiveMQ, ...)
 - Collectors (JMX, log messages, ...)
 - Dispatched by OSGi EventAdmin
 - Appenders (Elasticsearch, log, JDBC, ...)
 - Dashboards (Kibana) and SLA (DConsole)



- JAAS based (etc/org.apache.karaf.jaas.cfg) providing:
 - Multiple login modules (Properties, LDAP, JDBC, Apache Syncope)
 - Full RBAC/ACL mechanism for shell commands, JMX MBeans, OSGi services
 - Password encryption service
 - Can be used in your own application (JAAS standard code)





Karaf and development needs

Enterprise Java Specs



Servlet 3	JSP	JAX-WS	JAX-RS	JASPIC	JSR-88
EJB 3.1	CDI	JAX-RPC	JAXB	JACC	JSR-77
JSF 2	JTA	JAXR	JMS	JCA	RMI
JPA 2	Bean Validation	SAAJ	JAAS	JavaMail	JNDI

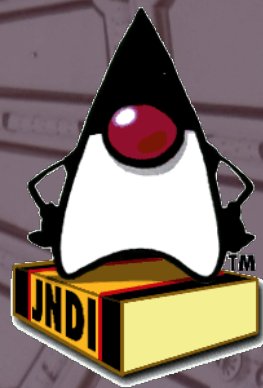


- JAAS based (etc/org.apache.karaf.jaas.cfg):
 - Realm/login modules (Properties, LDAP, JDBC, Apache Syncope)
 - Manage users/roles with dedicated commands/MBeans





- Easy to install (feature:install jndi)
- Provides an Initial Context Factory as OSGi service
- Allows you to create JNDI bindings/aliases for OSGi services
- Dedicated commands/MBeans (jndi:*)
- Works with Apache Aries JNDI for implicit bindings

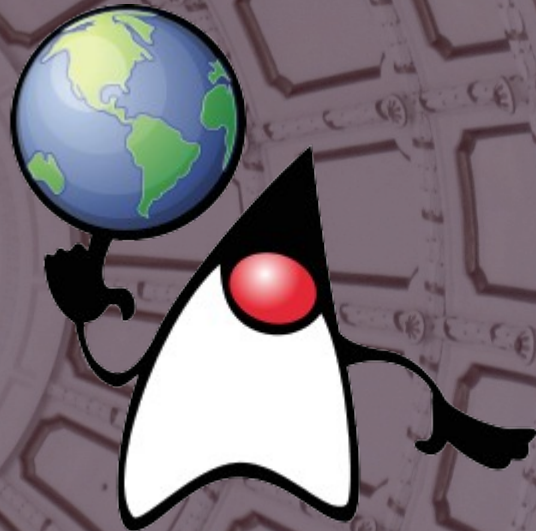




Pax-Web

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- Easy installation (feature:install war)
- Complete WebContainer using Jetty
- Support WAB and regular WAR
- Dedicated commands
and MBeans ([http:*](http://paxweb.apache.org) & [web:*](http://paxweb.apache.org))



PaxWeb

Pax-CDI

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- Easy installation (feature:install)
- Support different CDI engine (openwebbeans, weld)
- Support annotation-based dependency injection, interceptors and portable extensions combined with OSGi services



Apache Aries

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Apache Aries

- Aries JTA exposes the TransactionManager as an OSGi service and brings an impl (based on howl)
- Aries JPA exposes the EntityManager as an OSGi service
- Karaf provides direct features for popular JPA engine (Apache OpenJPA, Hibernate, EclipseLink)
- Karaf also provides the jdbc feature to easily create and manage the datasources (pax-jdbc)



Apache TomEE/OpenEJB

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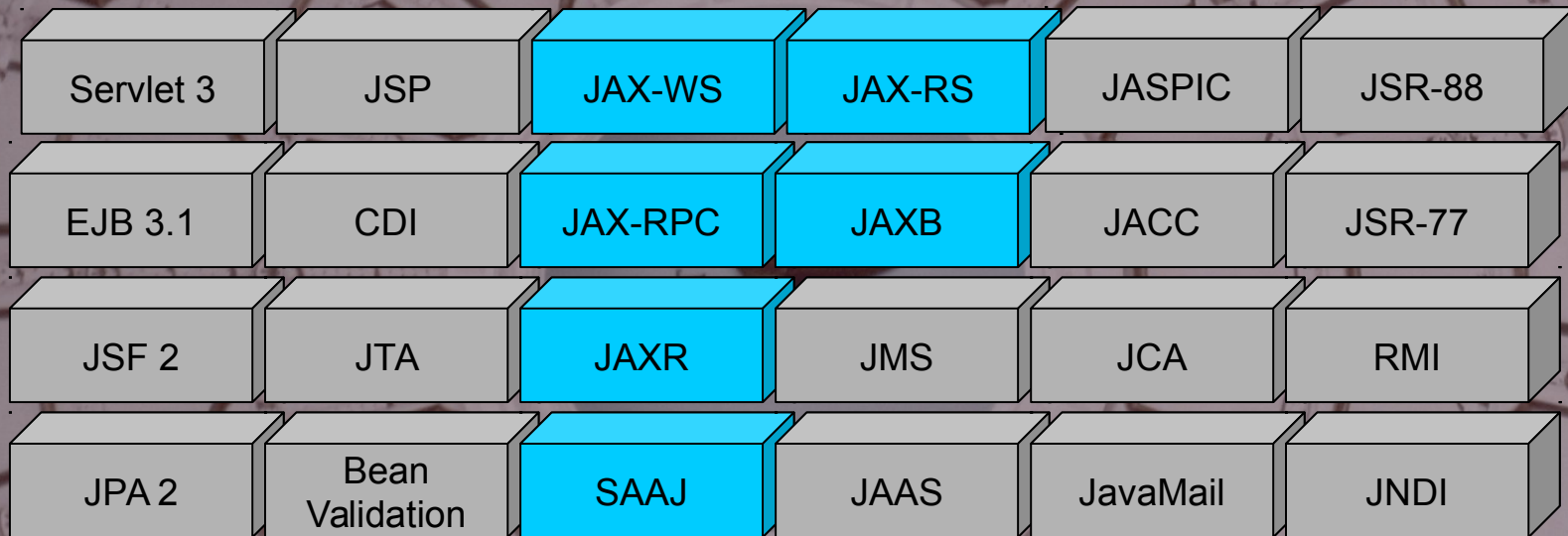
Apache TomEE/OpenEJB

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- Provides a feature to install OpenEJB in Karaf
- Proposal to provide KarafEE, custom Karaf distribution including OpenEJB
- Allows you to deploy bundles containing EJBs



Apache CXF

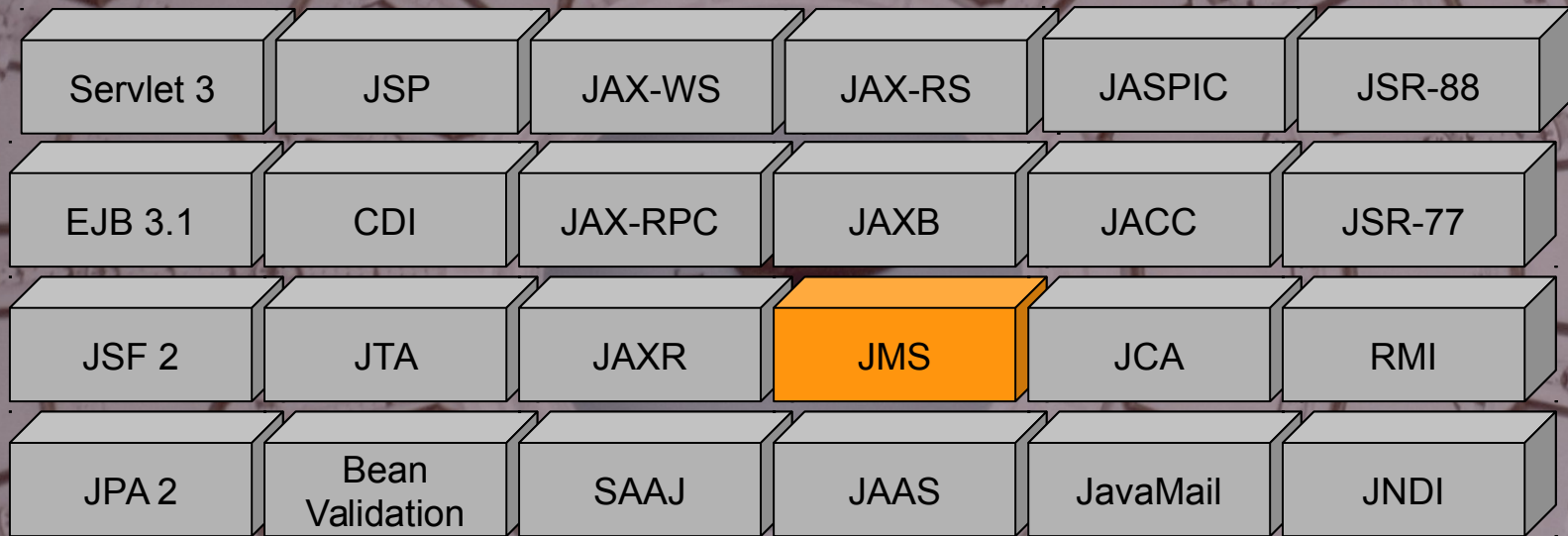


Apache CXF

- Ready to use features (feature:install cxf)
- Provides support of JAX-WS and JAX-RS, including blueprint namespace
- Leverage the Karaf WebContainer
- Provides complete WebService stack



Apache ActiveMQ



Apache ActiveMQ

- Ready to use features (feature:install activemq)
- Provides multiple JMS/AMQP broker in Karaf
- Dedicated commands to administrate the brokers (activemq:*)
- Dedicated commands to create and manage the JMS ConnectionFactory (jms:*)
- Leverage all ActiveMQ features (Master/Slave, Network Of Brokers, Durable Subscribers, etc)

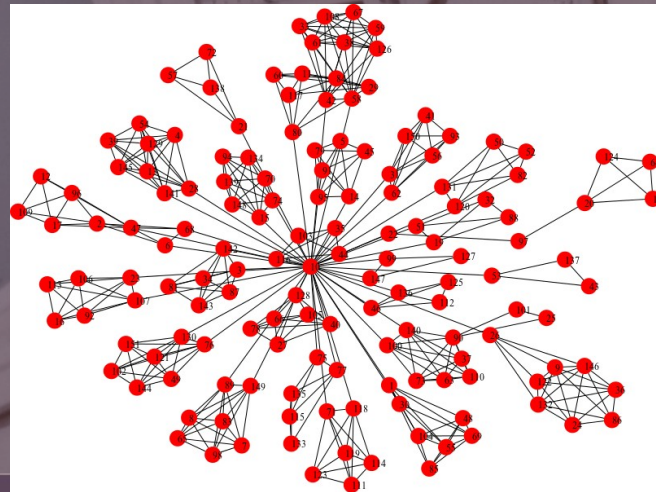


Apache Karaf Cellar

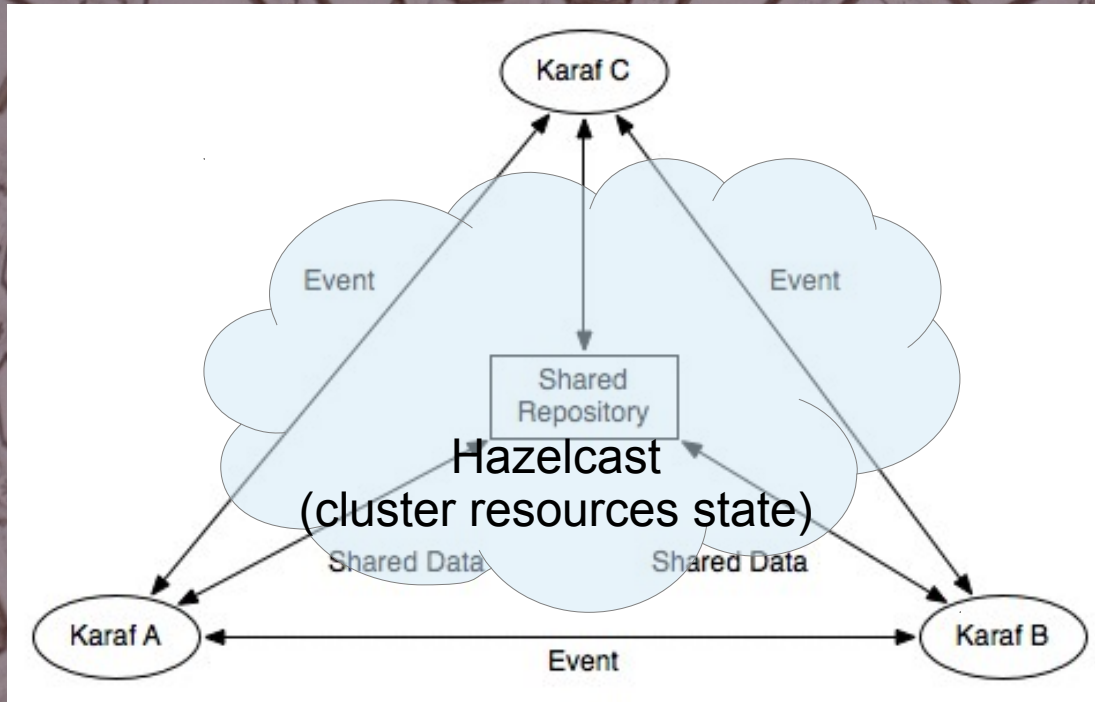


Apache Karaf Cellar

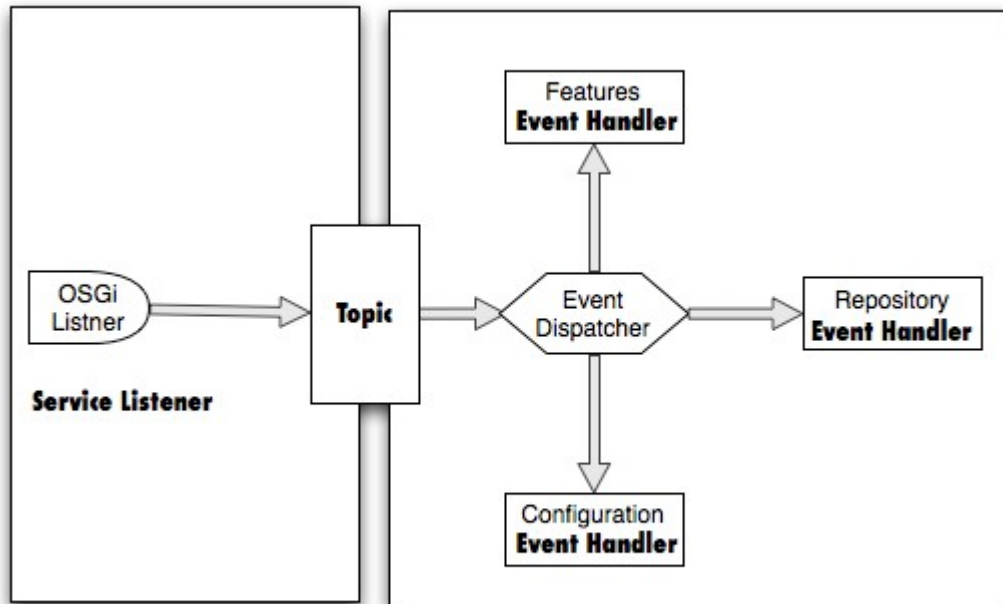
- Karaf itself provides HA (lock)
- Karaf Cellar brings cluster: sync provisioning between Karaf instances
- Leverage Hazelcast
- Easy to install and use
- No point of failure
- Provide DOSGi support (kind of RMI)



Apache Karaf Cellar



Apache Karaf Cellar



Karaf A

Karaf B

Apache Karaf Cellar

- Cluster groups
- Synchronizers: called at bootstrap or when a node joins a group
- Listeners: listen for local events and broadcast on the cluster (disabled by default)
- Producer: produces cluster events
- Consumer: receives cluster events
- Handlers: deal one particular kind of cluster event
- Managed by commands and MBeans (cluster:*)

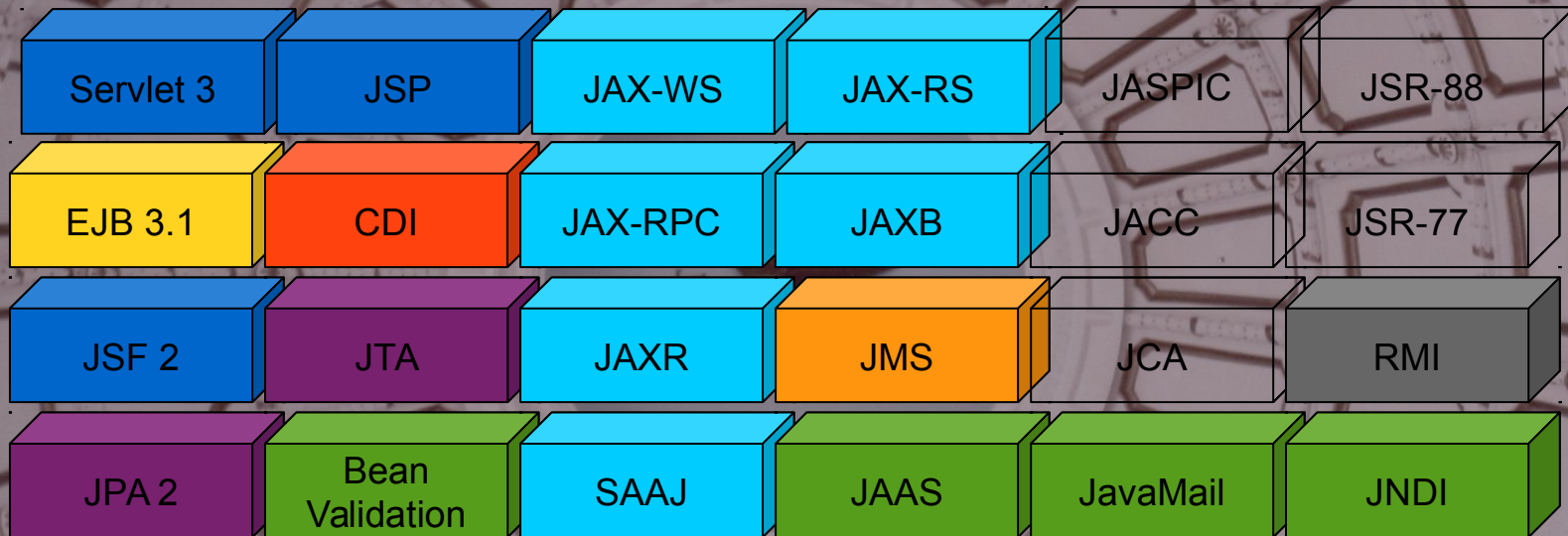
Apache Karaf Cellar

- DOSGi
 - Remote service
 - “Listen” for OSGi services with `service.exported.interfaces` property and expose on the cluster
 - Clients do regular OSGi service usage: Cellar intercepts the call and transport to the remote node where the actual service is living

Enterprise tooling

- Regular project using OSGi compliant plugins (Felix maven-bundle-plugin, bnd, ...) and IDE (IntelliJ IDEA, Eclipse, emacs, ...)
- Regular utest tools (JUnit, EasyMock, ...)
- Tools for itest (Pax Exam with Karaf container support)
- Karaf EIK (Eclipse Integration for Karaf) to embed Karaf in Eclipse: we need help there !

So finally ...



So finally ...

- hibernate-validator feature provides bean validation
- JavaMail OSGi bundle is available and can be installed
- Most of the enterprise specs are supported
- Convenient tooling
- Very flexible in terms of infrastructure (provisioning, monitoring, management, ...)



Very Simple project leveraging JPA/JTA, JDBC/JNDI, Servlet
and REST

<http://github.org/jbonofre/acna15>

And many more !

- Karaf Docker.io discussion
- Thanks to his flexibility, projects use Karaf:
 - ESB (ServiceMix) and integration with Apache Camel
 - Enterprise wide applications (with session failover and replication in Cellar)
 - MOM oriented application with Apache ActiveMQ integration
 - Big Data (Hadoop, Falcon, ...)
 - SDN appliance (OpenDaylight & NSOS)
 - And lot more that I don't know for sure ;)

Conclusion

- **Don't consider Karaf only as an monolythic OSGi container or ESB kernel, you can do much more with it !**



Thanks guys !

- Thanks to the Karaf community and especially:
 - Guillaume Nodet
 - Achim Nierbeck
 - Jamie Goodyear
 - Christian Schneider
 - Freeman Fang



The background of the slide is a photograph of the Arizona State Capitol building in Phoenix. In the foreground, there are several bronze statues on pedestals, including one of a man in a suit and another of a man in a military uniform. The building has a large dome and many windows. The sky is blue with some clouds.

Thanks !
Questions ?

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<http://github.com/jbonofre/acna15>

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