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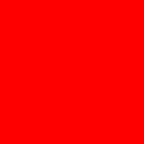
**GlassFish v3 - A Taste of a Next Generation Application Server**

Peter Doschkinow
Senior Java Architect

# Agenda

- GlassFish overview and positioning

- GlassFish v3 architecture

- Features beyond Java EE 6

    - Productivity

    - Modularity, OSGi support

    - Management and Monitoring

    - Scripting

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# Project Glassfish

- Java EE RI
  - Java EE 5.0, Java EE 6.0
  - Included in Java EE SDK
- Strong Developer Adoption
- Production Quality
- Open Source
- Strong Community
  - Sources, bug DBs, discussions at Java.Net
  - Roadmaps, Architecture Documents

# GlassFish Around You
http://maps.glassfish.org
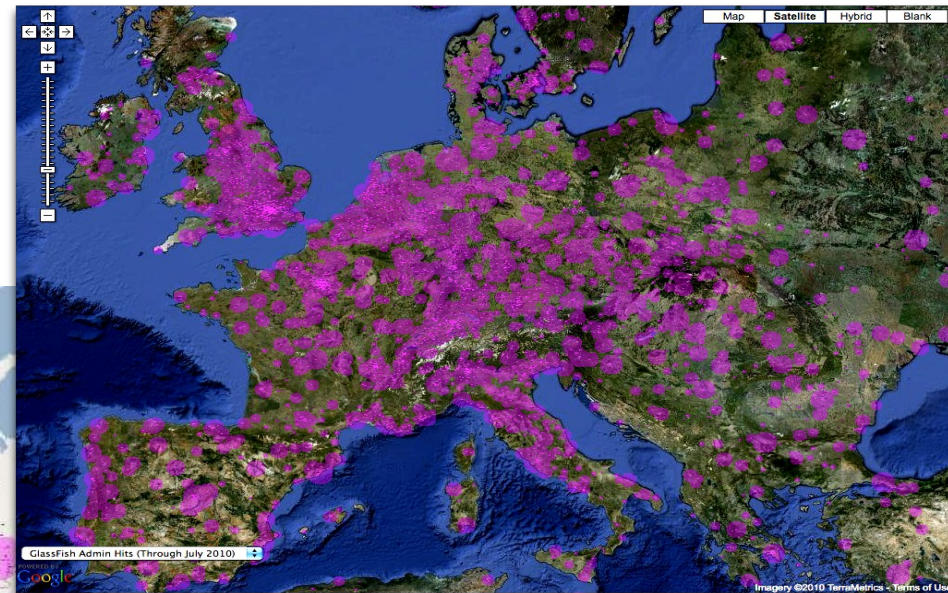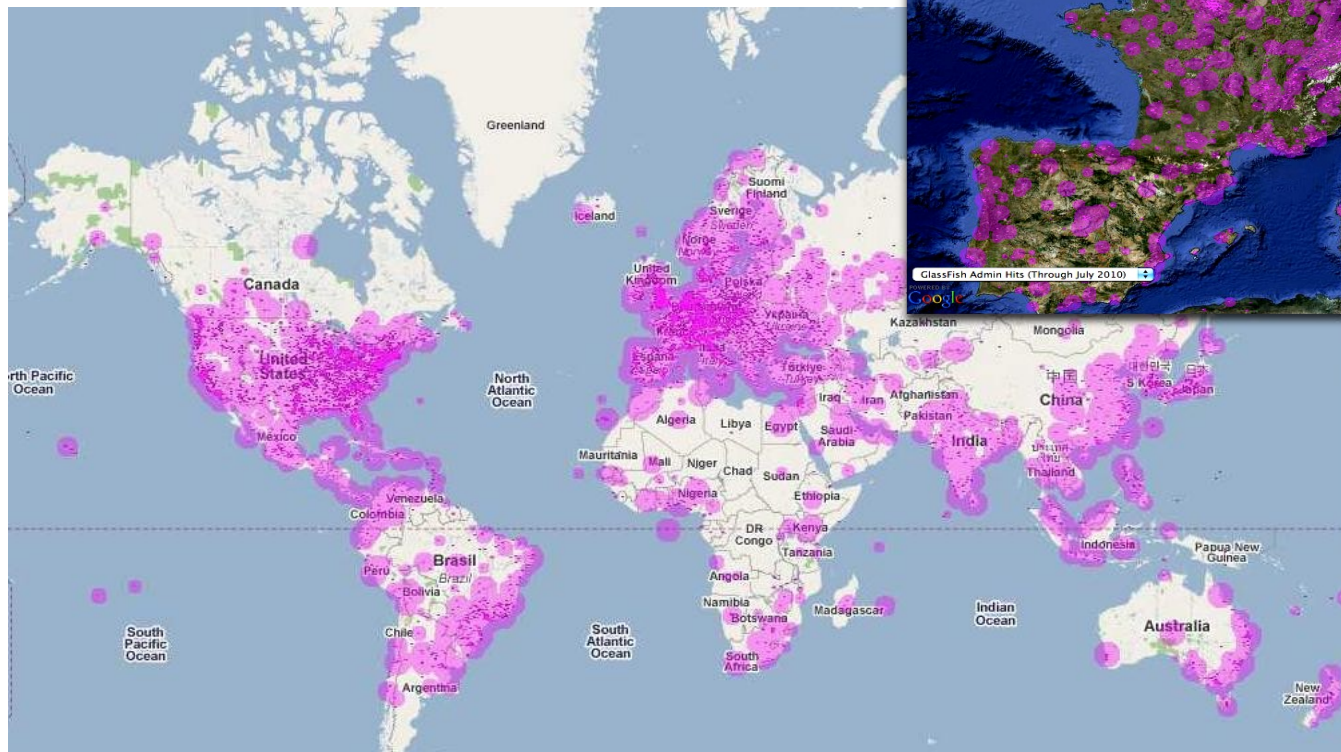
# GlassFish Deployment

blogs.sun.com/stories

# GlassFish
Distributions Available Today

| Distribution | License | Features |
|---|---|---|
| GlassFish Open Source Edition 3.0.1 | CDDL & GPLv2 | • Java EE 6 compatibility<br>• Web Profile distribution<br>• Single instance<br>• mod_jk for load balancing |
| GlassFish Open Source Edition 2.1.1 | CDDL & GPLv2 | • Java EE 5 compatibility<br>• In memory replication / clustering<br>• Centralized administration |
| Oracle GlassFish Server 3.0.1 | Commercial | • Adds<br>   • Oracle GlassFish Server Control<br>   • Patches, support, knowledge base |
| Oracle GlassFish Server 2.1.1 | Commercial | • Adds<br>   • Enterprise Manager<br>   • Patches, support, knowledge base |

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# Oracle Application Grid



**Custom App**

**Packaged App**

**SOA Service**

**C/C++/ COBOL**

**Legacy**

## Application Grid

**WebLogic Server**
GlassFish, Web Tier

**Tuxedo**

**Coherence**

**Java SE**

**HotSpot and JRockit**

**Enterprise Manager**

**Efficiency**
Lowest operational costs

**Competitiveness**
Outperform with speed and flexibility

**Simplification**
Best foundation for entire software stack
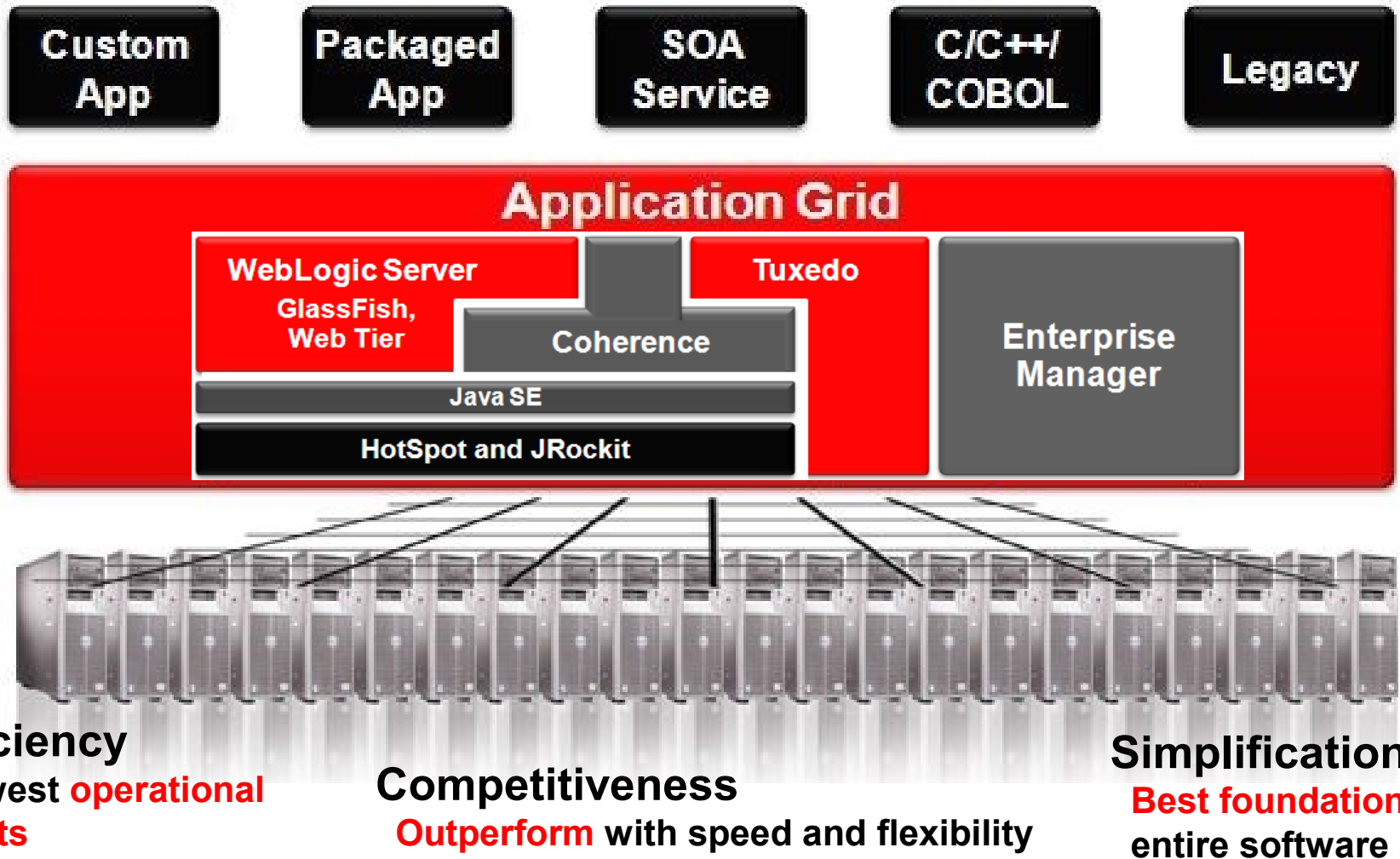
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# GlassFish and WebLogic Together

- Best open source application server with support from Oracle

- Open source platform of choice for light-weight Web applications

- Focus on latest Java EE standards and community driven innovation

- Certified interoperability with Fusion Middleware

- Differentiated innovation

- Best commercial application server for transactional Java EE applications

- Platform of choice for standardization

- Focus on lowest operational cost and mission critical applications

- integration with Oracle Database, Fusion Middleware & Fusion Applications



User Interaction
Enterprise Performance Management
Business Intelligence
Content Management
SOA & Process Management
Application Grid
Development Tools
Enterprise Management
Identity Management

Production Java Application Deployment

**GlassFish Server**

Production Java Application Deployment

**WebLogic Server**

# GlassFish Server Goals

| Java EE 6 Themes | Oracle GlassFish Server |
|---|---|
| • Flexibility | • Flexibility |
| • Extensibility | • Extensibility |
| • Developer Productivity | • Developer Productivity |
|  | • Modularity / OSGi / Hybrid Apps |
|  | • Manageability |
|  | • High availability clustering |
|  | • 24 x 7 x 365 support |

# GlassFish v3 Features

- Java EE 6 reference implementation
- Beyond Java EE 6
  - Developer productivity (will be treated separately)
  - Modular
  - Extensible
  - Embeddable
  - Observable
  - Hot technologies
    - Metro (Web Services)
    - Update Center
    - Scripting
    - Grizzly (HTTP Engine, Comet, mod_jk)

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# GlassFish v3 Architecture

**H**undred
**K**ilobyte
**K**ernel
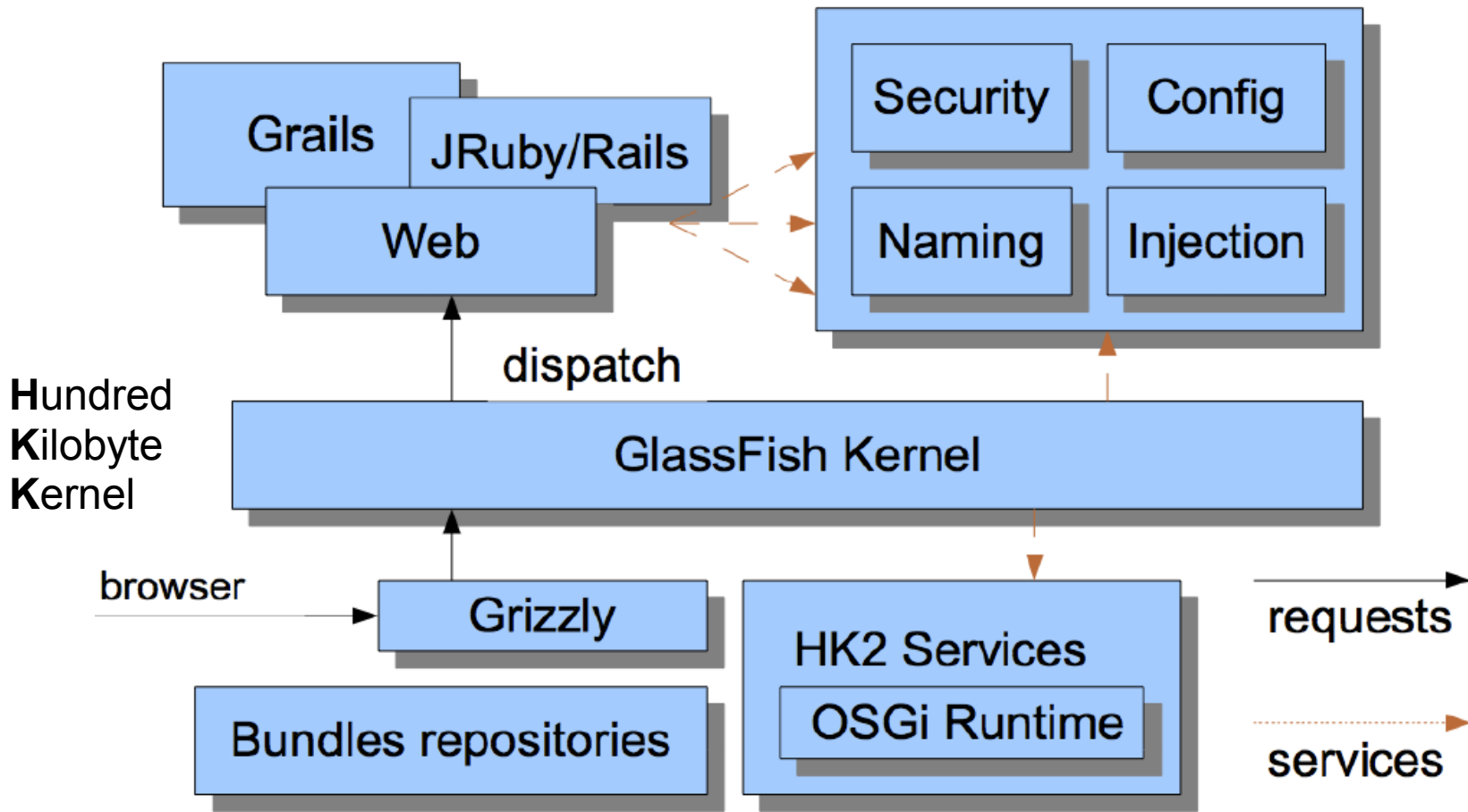
# GlassFish v3 Modularization and Extensibility

- Based on OSGi

- Extensible

  - Extensive APIs to replace or extend features
  - OSGi also provides extensions capabilities

- SOA based architecture

  - Services implement different types of interfaces

    - Java SE style with a META-INF/services file

    - OSGi style

    - HK2

  - Lazy loading based on usage patterns

- Makes it easier to provide support for new container types

# GlassFish v3 Runtime

GlassFish v3

HK2 Module System

Felix, Equinox binding

static binding

OSGi Runtime

JDK 6
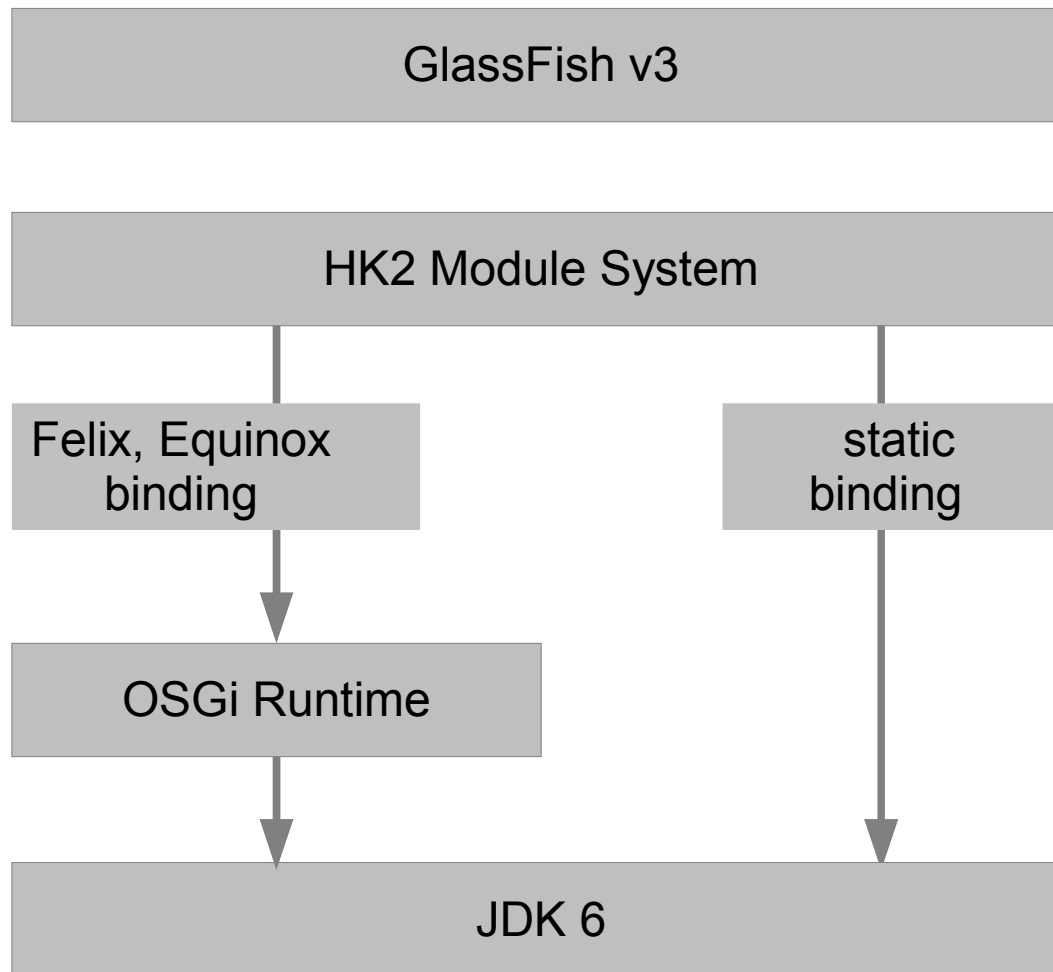
# Developer Productivity

- Getting Started
  - Small download
  - Fast startup time
  - Admin console with intuitive user interface
- Using GlassFish
  - Lightweight
  - Low resource utilization
  - Command Line Interface
  - Maven support
  - Rapid iterative development
  - Extensive IDE support

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# GlassFish v3 Tooling

- As usual, vi/emacs are Java EE 6 certified
  - Simpler to use: less code to type, less XML, less Interfaces to synchronized, more default values,...
- NetBeans 6.9.1 Java EE 6 ready
- Eclipse GlassFish Plugin 1.50 and above
- GlassFish Tools Bundle for Eclipse 1.2
- Oracle Enterprise Pack for Eclipse 11g
- IntelliJ IDEA 9
- Build your own: using GlassFish REST Admin APIs

# Deploying Applications and Components

- Deploy Packaged component or expanded directory
- Automatic Deployment
- JSP Precompile
- Deploy Java EE Application Client through Java WebStart
- Dynamic Reloading (great during development)
- Keep Session on redeploy (great during development)

# Session Retention

- Deployment option to maintain stateful sessions across re-deployments

- asadmin redeploy --properties    keepSessions=true myapp.war

- Greatly simplifies the development paradigm

- Integrated in tools

# GlassFish and OSGi

- Runs on top of OSGi (Felix by default)
  - Also runs unmodified on Knopflerfish and Equinox
  - GlassFish ships with 100+ bundles
  - Can run without OSGi (Static mode, thanks to HK2)
  - Can use OSGi management tools (CLI or Web)
- Extending GlassFish through OSGi
  - Any OSGi bundle will run in GlassFish Server
  - Drop it in glassfish/modules
  - Can also asadmin deploy it using "asadmin --type osgi ..."

# GlassFish and OSGi

- OSGi visibility extended from GlassFish developers to GlassFish users
- OSGi services can be easily used in any Java EE application

  <span style="color:red">@Resource(mappedName="checkOsgiService")</span>

  <span style="color:red">CheckService checkService;</span>

  – Client code portable, does not use any OSGi specific API
  – Restriction: OSGi dynamism does not work
    • Converged applications needed
- Implementation of  OSGi Enterprise specifications
  – HTTP Service, Web Container, JPA, JTA, JDBC

# Extending GlassFish v3 with OSGi
### http://blogs.sun.com/dochez/entry/glassfish_v3_extensions_part_4
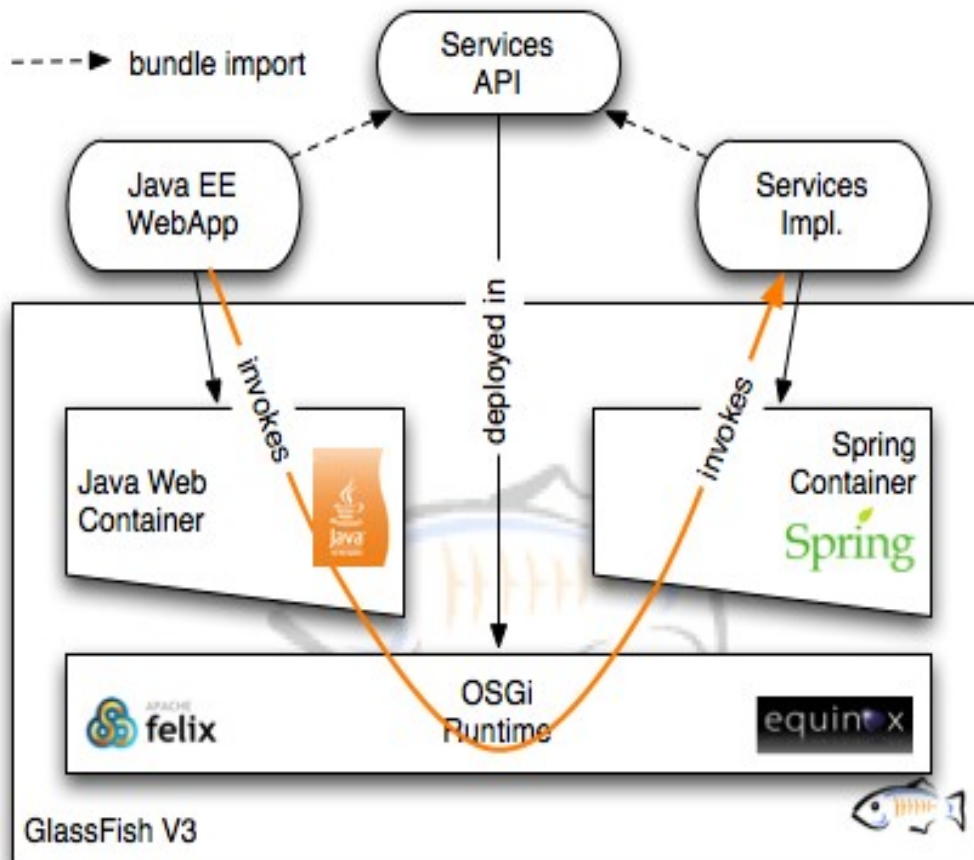


- Extend GlassFish with an unmodified Spring dm container

- Simple Spring bean implementing the service

- Invoke the service from a servlet using standard @Resource injection

- Still no use of a GlassFish API

- Single runtime for both Spring and full Java EE

## Hybrid Applications
use advantages from both worlds

- OSGi + Java EE = Hybrid application
- Hybrid application
  - An OSGi bundle
  - And a Java EE Archive
- Leverage the capabilities of both the platforms
  - Enterprise applications can
    - be built as modular OSGi bundles
    - use OBR, Config Admin, service tracking, etc.
  - OSGi bundles can use Java EE services like JTA, JPA
- Require a runtime that supports both standards

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# Web Application Bundle (WAB)
## OSGi/Web Application

- ## WAR + OSGi bundle configuration

  Manifest-Version: 1.0

  Import-Package: javax.servlet.http; javax.persistence

  Bundle-ClassPath: WEB-INF/classes/,WEB-INF/lib/entities.jar

  Bundle-Version: 1.0

  Bundle-ManifestVersion: 2

  Web-ContextPath: /hello

  Bundle-SymbolicName: test.hellowab

- ## Lifecycle now can be driven by OSGi

- ## Wrapped WAR Support

  – webbundle:file:///myWebApp.war?Web-ContextPath=/hello

# CDI Extenstion for OSGi in GlassFish

- @Inject @OSGiService MyOsgiService svc;
- Eliminates boilerplate code in OSGi service clients
  - For finding, binding and tracking OSGi service references
- Typesafe, in contrast to XML based Blueprint Service
- Available attributes for @OSGiService
  - Service discovery criteria in standard OSGi Filter syntax
  - Wait timeout
  - Dynamic binding for service dynamism through container injected proxy
- Applicable in WAB
  - Since BundleContext is needed

# GlassFish v3 Extensibility – Adding Scripting Frameworks
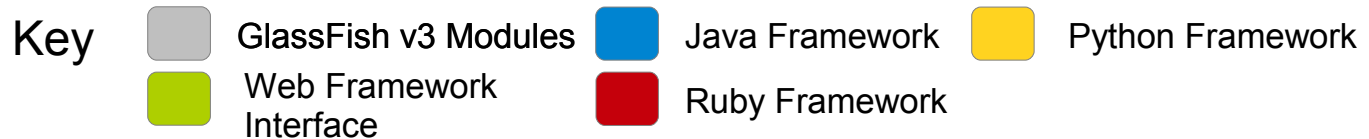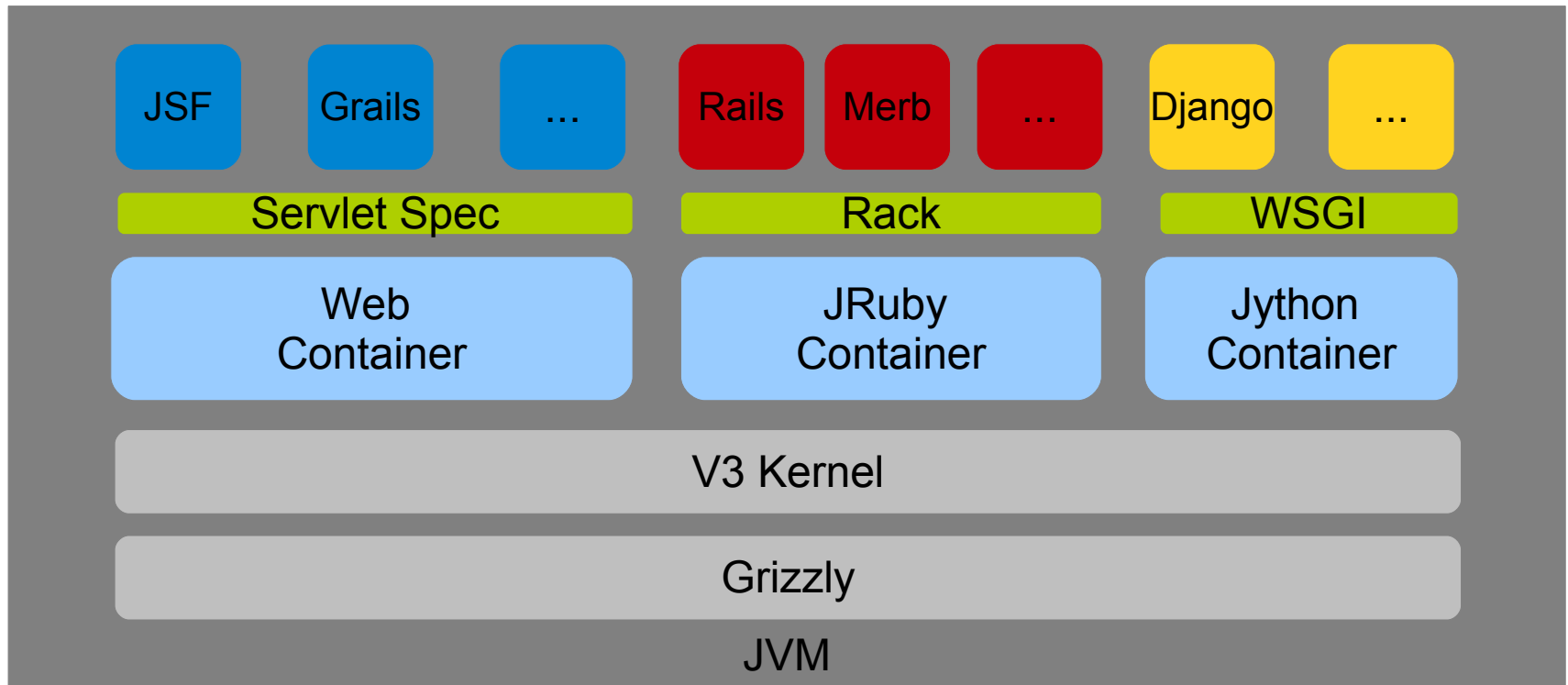
# Embedded Glassfish

- Start GlassFish inside your Java Application
  - API for life-cycle, configuration and deployment
- Use cases
  - In Unit Tests (without a GlassFish installation)
  - As a plugin for Maven 2 project
    - glassfish-embedded goals: run, start, stop, deploy, ...
  - As a "custom" app server
- Distribution
  - Standalone jars for web and full profile without a GF installation
  - Standalone jar for an existing GF installation
  - Maven plugin: http//download.java.net/maven/glassfish/

# Embedded Glassfish

```java
@BeforeClass public static void initContainer() {

    Server.Builder builder = new Server.Builder();
    Server server = builder.build();

    ContainerBuilder b =
                server.createConfig(ContainerBuilder.Type.web);
    server.addContainer(b);

    File archive = new File("hello.war");
    server.getDeployer().deploy(archive);

}

@Test public static void pingApplication() {

    ...

}
```

# Manageability: Flexible Administration
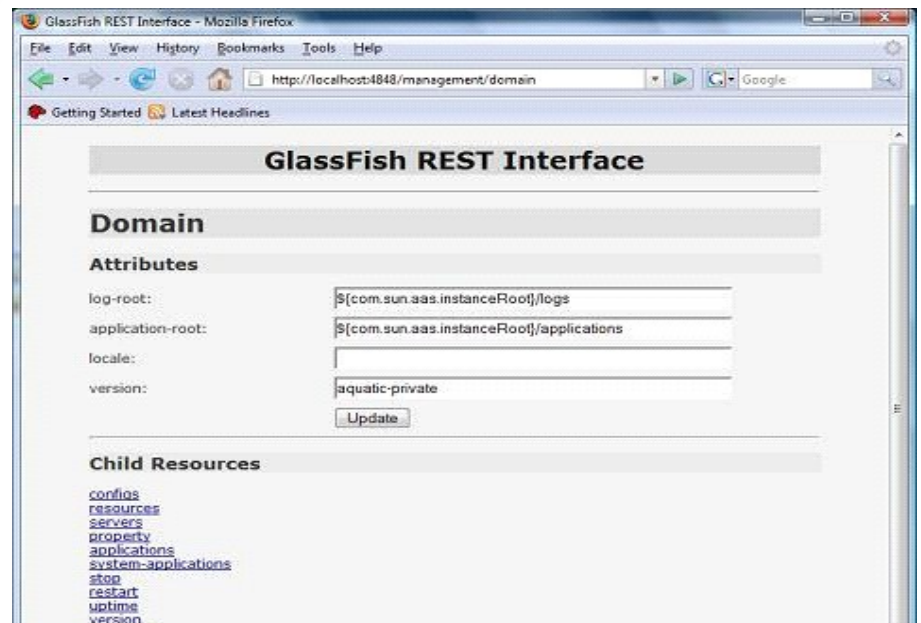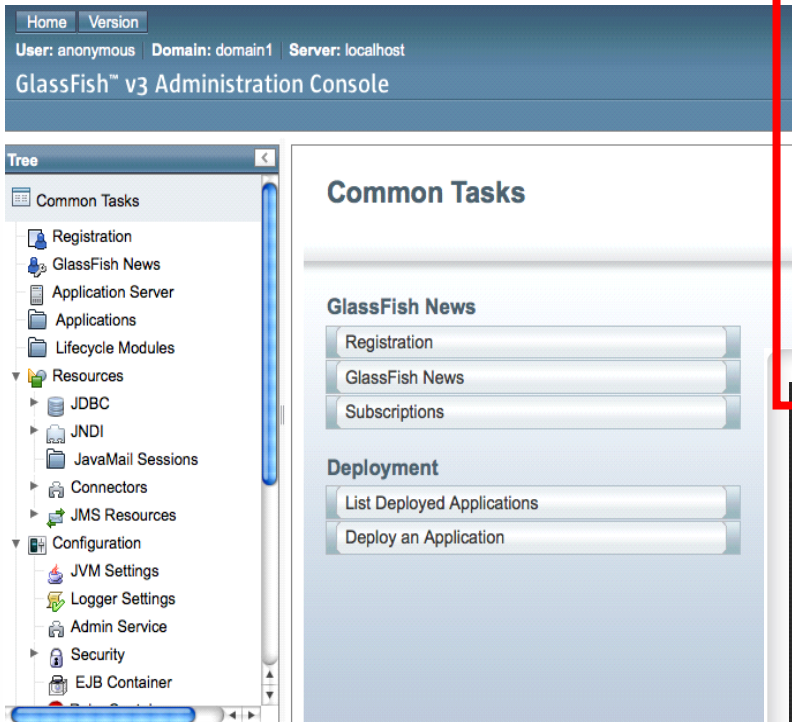
# Monitoring and Management

- Dynamic and non-intrusive monitoring
- BTrace integration
    - Portable, dynamic and safe tracing tool for Java
    - Btrace annotations and API to write scripts
    - Java-defined Probe Providers
    - DTrace for end-to-end
- JavaScript Monitoring tool (add-on)
- Still exposed via AMX/JMX
    - jconsole and visualvm as natural clients

## RESTful Administration
Ready for the Cloud

- JAX-RS/Jersey offers REST-Interface to
  - Runtime configuration (via GET, POST, DELETE)
  - admin command execution (restart, stop, deploy, etc..)
  - Monitoring (GET only)
- Start at
  - http://localhost:4848/management/domain
    http://localhost:4848/monitoring/domain
- Use of REST-Clients instead of Admin-GUI
  - build on your preferred scripting language or tool
- Data format as XML, HTML or JSON
- Extensible

# GlassFish v3 Monitoring
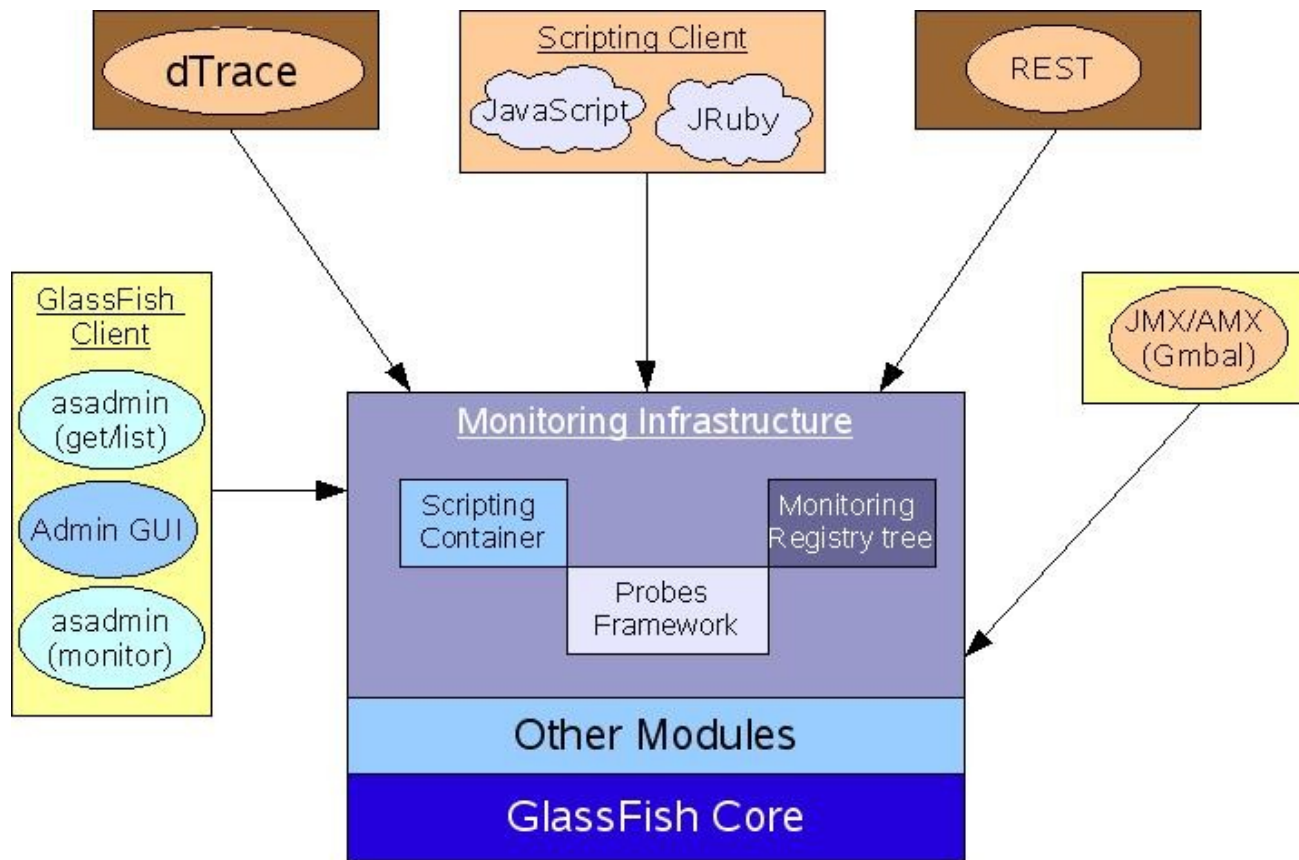


– based on probes, similar to DTrace

– new: client-side scrtipting and DTrace monitoring support

# GlassFish Update Center



**Rich Client**

**Web Browser**

**Command Line**

# GlassFish Server 3.1 Developer Highlights

- ## Developer Productivity
  - Improved embedded API support
  - Updated NetBeans and Eclipse plugin
- ## Updated Technologies
  - Grizzly WebSocket support
  - Technology refresh – JSF, CDI, Grizzly, OSGi, JPA,Jersey, Bean Validation, Metro, UC, etc.
  - Implementation of various Enterprise OSGi Specs

# GlassFish Server 3.1 Clustering/HA Highlights

- Shoal GMS over HTTP (Grizzly) implementation
    - Removes the need for TCP broadcast network setup
- Consistent hash based session replication
- Preferred fail-over by load-balancer plugin
- Metro HA: Reliable messaging sequence failover, Secure conversation session failover
- Support for conventional clustering of MQ brokers in embedded mode
- Improved automatic delegated transaction recovery with shared file system

# GlassFish Server 3.1 Manageability Highlights

- Application versioning support

- Application scoped resources

- Statement leak detection and reclaim

- Improved monitoring

- Support for PAM realm

- SSH based remote management and provisioning

- Console based on RESTful API

# GlassFish Server Open Source Edition Roadmap

- No change to operation of project
  - License, governance, transparency

| CY 2010 | CY 2011 | TBD |
|---|---|---|
| **GlassFish 3.0.1**<br>• Branding, Patches<br>• Multi-Lingual Support<br>• New platform support<br>• Oracle product interoperability | **GlassFish 3.1**<br>• High availability<br>• Centralized admin.<br>• Coherence*Web Support<br>• Improved application portability to WLS<br>• Application versioning<br>**GlassFish 3.2**<br>• OSGi Enterprise<br>• Improved administration monitoring and<br>• Virtualization | **GlassFish 4**<br>• Java EE 7 Compatibility<br>• More shared components with Oracle WebLogic Server |

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## GlassFish v3 Summary

**Java EE 6 Themes**         **GlassFish v3**

Flexibility    →    Flexible

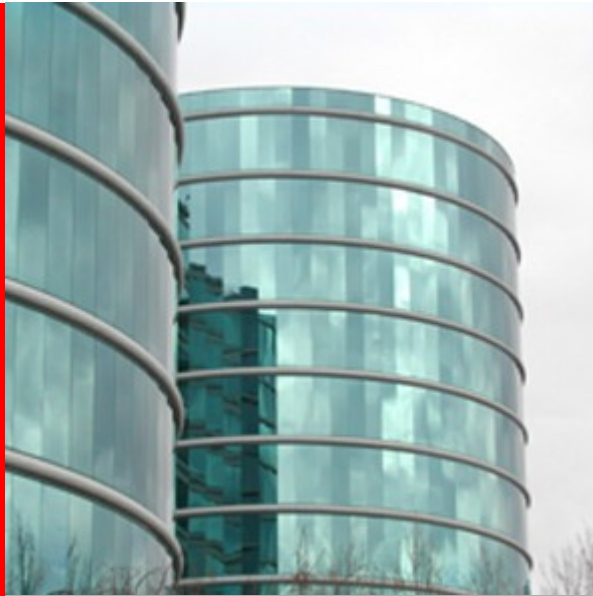Extensibility    →    Extensible

Productivity    →    Productive

... + ...

High Developer Productivity

Bleeding Edge Technologies
Enterprise Quality

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**GlassFish v3 - A Taste of a Next Generation Application Server**

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# Java EE 6 Demo

- Focus on ease of use with GlassFish 3.0.1 and NetBeans 6.9.1

- HelloWorld type demos showcasing
  - EJB 3.1
  - JSF 2.0
  - JPA 2.0
  - CDI
  - JAX-RS 1.1

# Oracle Enterprise Pack for Eclipse 11g

- A free set of Eclipse plug-ins for development of Java EE applications for Oracle Fusion Middleware

    – Supports newest Eclipse 3.6 Helios release

- Includes Java EE 6 tools with support for

    – JSF 2.0, Facelets, JSF 2.0 composite components

    – Servlet 3.0, JPA 2.0, EJB 3.0 and more

- Extended support for GlassFish

    – Life-cycle, configuration, deployment, debugging

- Extends support for WebLogic and Coherence

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