GlassFish V3

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hk2.dev.java.net, glassfish.dev.java.net

Goal of Your Talk

What Your Audience Will Gain

Learn how the GlassFish V3 groundbreaking architecture is based on IoC, modules and maven 2.

Agenda

Demo !

Modules Subsystem

Build System

Services, services

Inversion of Control

Components, scopes

DEMO

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Module Subsystem : HK2

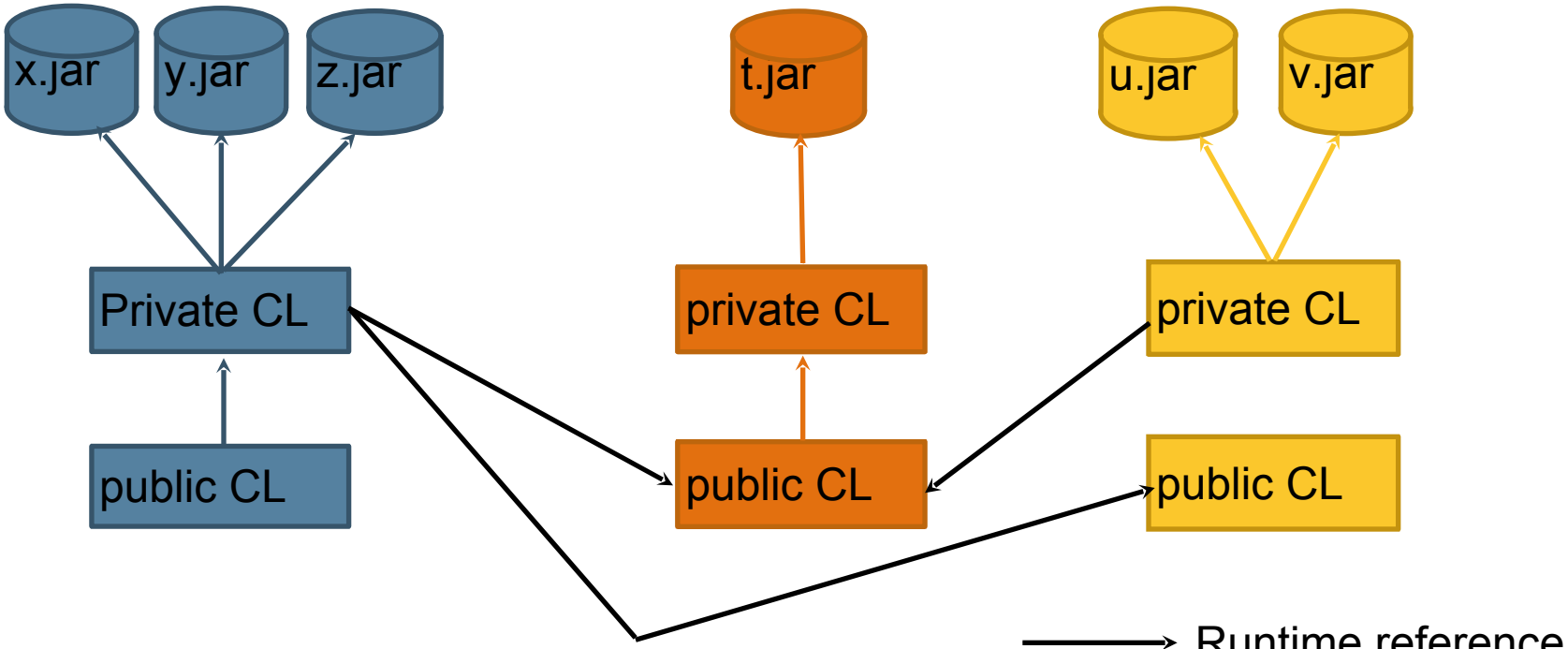
Introduction

- Loosely based on the work of JSR 277
- Due in Java SE 7
- Expert group still evolving the APIs
- Added hooks to provide extensibility points for other module types :
- maven
- OSGi
- Fits in 50 Kb : Hundred Kilobytes Kernel
- Runs on Java SE 5.

Module Instances

- At runtime, modules are identified by Module instances.
- Each Module has 2 ClassLoaders
- public that users have access to (facade)
- private that load all the module's classes
- Modules have a list of other module's class loaders to load imported classes.
- Garbage collection happens when all references to the public class loader are released.

Runtime network of class loaders



Module Definitions

Name : A
Imports: B, C

Name : B
Imports:

Name : C
Imports: B

Repository

- Repositories hold modules
- Can be added and removed at run time
- Different types supported
  - directory based
  - maven
  - OSGi ?
- Modules can be added/updated/removed from repositories

Bootstrapping

- Module subsystem can bootstrap itself
- No more classpath at invocation
- Application startup code is packaged in a jar file.
- Application code only need to implement the ApplicationStartup interface.
- Application code can declare dependencies in its manifest code.
- to run : java -jar
- For GlassFish : java -jar glassfish.jar

Build system : maven 2

- Each module is build from a maven project (pom.xml)
- pom.xml describes the module's
  - name
  - version
  - dependencies
- manifest entries are created automatically from pom.xml info
- pom.xml not used directly for performance reasons.

Module Example

Declare your module like :

```
    <groupId>com.sun.enterprise.glassfish</groupId>
    <artifactId>gf-web-connector</artifactId>
    <packaging>modsys-jar</packaging>
```

and dependencies with :

```
<dependencies>
    <dependency>
        <groupId>com.sun.enterprise.glassfish</groupId>
        <artifactId>webtier</artifactId>
        <version>${project.version}</version>
    </dependency>
....
```

Resulting definition

```
Jar File Manifest file :

Built-By : dochez
Created-By : Apache Maven
Implementation-Title : gf-web-connector
Manifest-Version : 1.0
Extension-Name : gf-web-connector
Implementation-Version : 10.0-SNAPSHOT
Import-Bundles : com.sun.enterprise.glassfish:webtier,
com.sun.enterprise.glassfish:v3-core
```

Build Repositories

- HK2 repository has been implemented using a maven repository backend.
- Build system puts modules in the maven repository.
- Running GlassFish gets the modules from the maven repository
- Once we got passed the maven bugs and quirks, build got a lot simpler than in V1/V2 leading to developer productivity.

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Services, services

- GlassFish V3 use extensively Services to identify extension points like :
  - Application Containers (like Web-App, Phobos, JRuby...)
  - Administrative Commands
- Services are :
  - implementing an interface
  - declared with META-INF/services file
- Can be stateless or statefull

Services in V3

- Interfaces are declared with @Contract
- Implementations are declared with @Service
- Build system will generate META-INF/services file automatically

```
@Contract
public interface Startup {...}

@Service
public class ConfigService implements Startup
{
...
}
```

@Service definition

```
public @interface Service {

    String name() default "";

    Class<? extends Scope> scope() default PerLookup.class;

    Class<? extends Factory> factory() default Factory.class;

}
```

Example :

```
@Contract
public interface AdminCommand {...}

@Service(name=”deploy”)
public class DeployCommand implements AdminCommand {
    ...
}
```

Current @Contract

- Startup : code to run at server startup
- Sniffer : code to identify deployable artifacts
- Deployer : code to deploy artifacts in a container
- AdminCommand : administrative commands
- Adapter : Grizzly adapter to receive web requests
- WebRequestHandler : adapter to service particular URL web requests.

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Dependency Injection

- @Inject to declare a dependency
  - On any @Service annotated class
  - Field :

```
@Inject
ConfigService config;
```

  - Setter method :

```
@Inject
public void set(ConfigService svc) {..}
```

- Use ComponentManager to retrieve services instances :
  - `public <T> T getComponent(Class<T> providerClass)`
  - `public Iterable<T> getComponents(Class<T> contract)`

Extraction

- All @Service annotated classes are extracted and available using an @Inject annotation.
- @Extract to declare extra values extraction
  - On any @Service annotated class
  - Field :

```
@Extract
ConfigService config;
```

  - Getter method :

```
@Extract
public ConfigService getConfigService() {..}
```

@Service life-cycle methods

- PostContruct interface
  - one method : postConstruct()
  - called after injection is performed and before it is made publicly available
- PreDestroy interface
  - one method : preDestroy()
  - called after the service is removed from public access.
- Available to all @Service annotated class
- Handled by the HK2 Runtime.

Components Instantiation stages

- Components Creation
  - new()
  - injection of all @Inject annotated resources
  - postConstruct()
  - extraction of all @Extract annotated resources
  - extraction of the instance
- Components Destruction
  - removed from public
  - all @Extract annotated resources removed from public
  - preDestroy() called

Instantiation cascading

```
@Contract
public interface Startup {...}

Iterable<Startup> startups;
startups = componentMgr.getComponents(Startup.class);

DeploymentService:java
@Service
public class DeploymentService implements Startup {

@Inject
ConfigService config;
}

ConfigService.java:
@Service
public Class ConfigService implements ... {...}
```

Injection of that resource

will trigger instantiation of the service impl

Components Scopes

- Components have scopes.

```
@Service(Scope=Singleton.class)
public class ConfigService implements Startup {...}
```

- Scopes are components...
- therefore extensible

```
@Service
public MyScope implements Scope {...}
```

- Scopes defines the boundaries of components visibility.

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Container life-cycle

Application container life-cycle startup

- Each container ship with a connector module
  - containing at least one Sniffer

```
@Contract
public interface Sniffer {

    public boolean handles(File location);
    public String getModuleType();
    public void setup(String containerHome,
             Logger logger) throws IOException;
    public void tearDown();
 }
```

  - Each sniffer gets called on deployment request
  - handles() return true when they recognize a module type

Application container life-cycle startup

- Once a Sniffer is selected :
  - Sniffer::setup() is responsible for the container's installation (eventually from the internet).
  - Sniffer::setup() is also adding HK2 Repositories to the module subsystems.
  - Deployer service is looked up from the new Repositories with the right module type (obtained from Sniffer::getModuleType()).
  - Deployer service is invoked.

Application container life-cycle shutdown

- When last application is undeployed
- Sniffer:tearDown() will be called :
  - should remove any repositories added to the module system.
  - must return in a state where setup() can be called successfully
- Glassfish v3 will release all references to the container's runtime.
- Container should be garbage collected.

Application Server startup

- GlassFish v3 startup implemented by Startup interfaces.
- AppServerStartup.java is a component itself

```
@Inject
ComponentManager cm;

...
Iterable<Startup> startupsvcs =
        cm.getComponents(Startup.class);
```

GlassFish shutdown

```
@Service(name="stop-domain")
public class StopDomainCommand
    implements AdminCommand, PostConstruct{

@Inject
Startup[] startupSvcs;

@Inject
ComponentManager cm;

public void postConstruct() {

     cm.removeComponents(startupSvcs);
}
}
```

Summary : GlassFish V3

- Decomposition of the Java EE application server implementation
- Easy to embed all types of container that run on the JVM
- Embeddable
- Based on module subsystem (HK2)
- Use innovative and reusable components technology
- Available today in preview

For More Information

Links

- http://hk2.dev.java.net/
- http://glassfish.dev.java.net/
- http://wiki.glassfish.java.net/

Emails

- jerome.dochez@sun.com
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Instructions:
(Delete this red box before submitting your slides)

Use this slide to mark the beginning of the Question & Answer section of your presentation.

Q&A

Optional Speaker Names Here