Fun with EJB and OpenEJB

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#OpenEJB

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The Basics - History

- Timeline
  - 1999 - Founded in Exoffice - EJB 1.1 level
  - 2001 - Integrated in Apple's WebObjects
  - 2002 - Moved to SourceForge
  - 2003 - Integrated in Apache Geronimo
  - 2004 - Moved to Codehaus
  - 2006 - Moved to Apache Incubator
  - 2007 - Graduated Apache OpenEJB
- Specification involvement
  - EJB 2.1 (Monson-Haefel)
  - EJB 3.0 (Blevins)
  - EJB 3.1 (Blevins)
  - EJB 3.2 (Blevins)

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Focuses since inception

- Always an Embeddable EJB Container
  - Good idea for Embeddable Databases, good idea for us
  - Our downfall in early 2000 -- people were not ready
  - Our success after EJB 3.0
- No love for traditional Application Servers
  - Don't give up **`main(String[] args)`**
- Always doing the Opposite
  - Instead of putting the Application in the Container, put the Container in the Application
- What do you mean hard to test??
  - Don't blame EJB because your Server is hard to test
  - In what way is mocking not writing an EJB container?

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We were only pretending to test

EJB Vision & Philosophy

- Misunderstood technology
  - Many things people attribute to “EJB” are not part of EJB
- EJB can be light
  - EJB as a concept is not heavy, implementations were heavy
- EJB can be simpler
  - Though the API was cumbersome it could be improved
- EJB can be used for plain applications
  - The portability concept can be flipped on end
- The flexability applications get also provides great flexability to the container to do things differently yet not break compliance

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There is no “heavy”
requirement

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Show me the heavy

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EJB.next and Java EE.next

- Promote @ManagedBean to a Session bean
- Break up EJB -- separate the toppings
  - @TransactionManagement
  - @ConcurrencyManagement
  - @Schedule
  - @RolesAllowed
  - @Asynchronous
- Allow all annotations to be used as meta-annotations
- Modernize the Connector/MDB relationship
- Interceptor improvements
- Balance API
  - Everything that can be turned on should be able to shut off
- Improve @ApplicationException

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Interceptor -- Today

```
    @InterceptorBinding
@Target(value = {ElementType.TYPE})
@Retention(RetentionPolicy.RUNTIME)
public @interface Log {
}

@Log
public class FooBean {

    public void somethingCommon(){
      //...

    public void somethingImportant() {
      //...

    public void somethingNoteworthy() {
      //...
}

@Log
public class LoggingInterceptor {

    private java.util.logging.Logger logger =
            java.util.logging.Logger.getLogger("theLogger");

    @AroundInvoke
    public Object intercept(InvocationContext context) throws Exception {
        logger.info("" + context.getMethod().getName());
        return context.proceed();
    }
}
```

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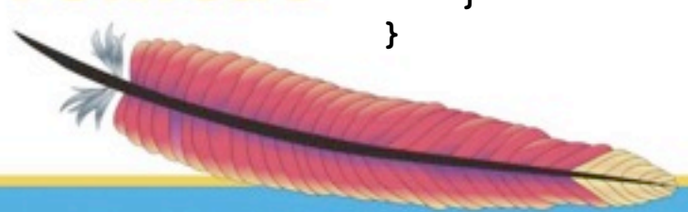

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Interceptor Improvements

```
    @Log
public class FooBean {

    public void somethingCommon(){
        //...
    }

    @Info
    public void somethingImportant() {
        //...
    }

    @Fine
    public void somethingNoteworthy() {
        //...
    }
}
```

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Interceptor Improvements

```
    @Log
public class LoggingInterceptor {

    private java.util.logging.Logger logger =
            java.util.logging.Logger.getLogger("theLogger");

    @AroundInvoke
    public Object finest(InvocationContext context) throws Exception {
        logger.finest("" + context.getMethod().getName());
        return context.proceed();
    }

    @Info
    public Object info(InvocationContext context) throws Exception {
        logger.info("" + context.getMethod().getName());
        return context.proceed();
    }

    @Fine
    public Object fine(InvocationContext context) throws Exception {
        logger.fine("" + context.getMethod().getName());
        return context.proceed();
    }
}
```

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Meta-Annotations

```
    @RolesAllowed({"SuperUser", "AccountAdmin", "SystemAdmin"})
@Stereotype
@Target(METHOD)
@Retention(RUNTIME)
public interface Admins {}
```

```
@Schedule(second="0", minute="0", hour="0", month="*", dayOfWeek="*", year="*")
@Stereotype
@Target(METHOD)
@Retention(RUNTIME)
public @interface Hourly {}
```

```
@Schedule(second="0", minute="0", hour="0", month="*", dayOfMonth="15,Last", year="*")
@Stereotype
@Target(METHOD)
@Retention(RUNTIME)
public @interface BiMonthly {}
```

```
@Singleton
@TransactionManagement(CONTAINER)
@TransactionAttribute(REQUIRED)
@ConcurrencyManagement(CONTAINER)
@Lock(READ)
@Interceptors({LoggingInterceptor.class, StatisticsInterceptor.class})
@Stereotype
@Target(TYPE)
@Retention(RUNTIME)
public @interface SuperBean {}
```

Meta-Annotations

```
    @Singleton
@TransactionManagement(CONTAINER)
@TransactionAttribute(REQUIRED)
@ConcurrencyManagement(CONTAINER)
@Lock(READ)
@Interceptors({LoggingInterceptor.class, StatisticsInterceptor.class})
public class MyBean {

    @Schedule(second="0", minute="0", hour="0", month="*", dayOfWeek="*", year="*")
    public void runBatchJob() {
        //...
    }

    @Schedule(second="0", minute="0", hour="0", month="*", dayOfMonth="15,Last", year="*")
    public void sendPaychecks() {
        //...
    }

    @RolesAllowed({"SuperUser", "AccountAdmin", "SystemAdmin"})
    public void deleteAccount(String accountId) {
        //...
    }
}
```

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Meta-Annotations

```
@SuperBean
public class MyBean {

    @Hourly
    public void runBatchJob() {
        //...
    }

    @BiMonthly
    public void sendPaychecks() {
        //...
    }

    @Admin
    public void deleteAccount(String accountId) {
        //...
    }
}
```

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Testing

Embeded / Testing Principles

- Be as invisible as possible
- No special classloaders required
- No files
  - All Configuration can be done in the test or via properties
  - No logging files
  - No database files (in memory db)
- No ports
  - Remote EJB calls done with “intra-vm” server
  - JMS done via embedded broker with local transport
  - Database connections via embedded database
- No JavaAgent
  - Avoidable if not using JPA or if using Hibernate as the provider
  - OpenJPA to a limited extent

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What can you test?

- EJBs
  - @Stateless
  - @Stateful
  - @Singleton
  - @MessageDriven
  - @ManagedBean
  - Interceptors
  - Legacy EJB 2.x and earlier
- Views
  - @Remote
  - @Local
  - @LocalBean
  - @WebService (requires a port)

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What can you test? (cont.)

- Container Provided resources
  - DataSources
  - EntityManagers and EntityManagerFactories
  - JMS Topics/Queues
  - WebServiceRefs
  - Any Java EE Connector provided object
- Services
  - Timers
  - Transactions
  - Security
  - Asynchronous methods

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What can't you test?

- ~~Servlets~~
- ~~Filters~~
- ~~Listeners~~
- ~~JSPs~~
- ~~JSF Managed Beans~~
- ~~Non-EJB WebServices~~

Hello, TomEE

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Unique Testing Features

- Most spec complete embedded container
- Fast startup (1 - 2 seconds)
- Test case injection
- Overriding
  - Configuration overriding
  - Persistence Unit overriding
  - Logging overriding
- Test centric-descriptors
  - test-specific ejb-jar.xml or persistence.xml, etc.
- Validation
  - Compiler-style output of application compliance issues
  - Avoid multiple “fix, recompile, redeploy, fail, repeat" cycles
- Descriptor output -- great for xml overriding

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Questions?

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thank you!

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