Introduction to JBoss Application Server 5.0

Paris JUG, 2nd of December 2008

Sacha Labourey
CTO JBoss, a division of Red Hat

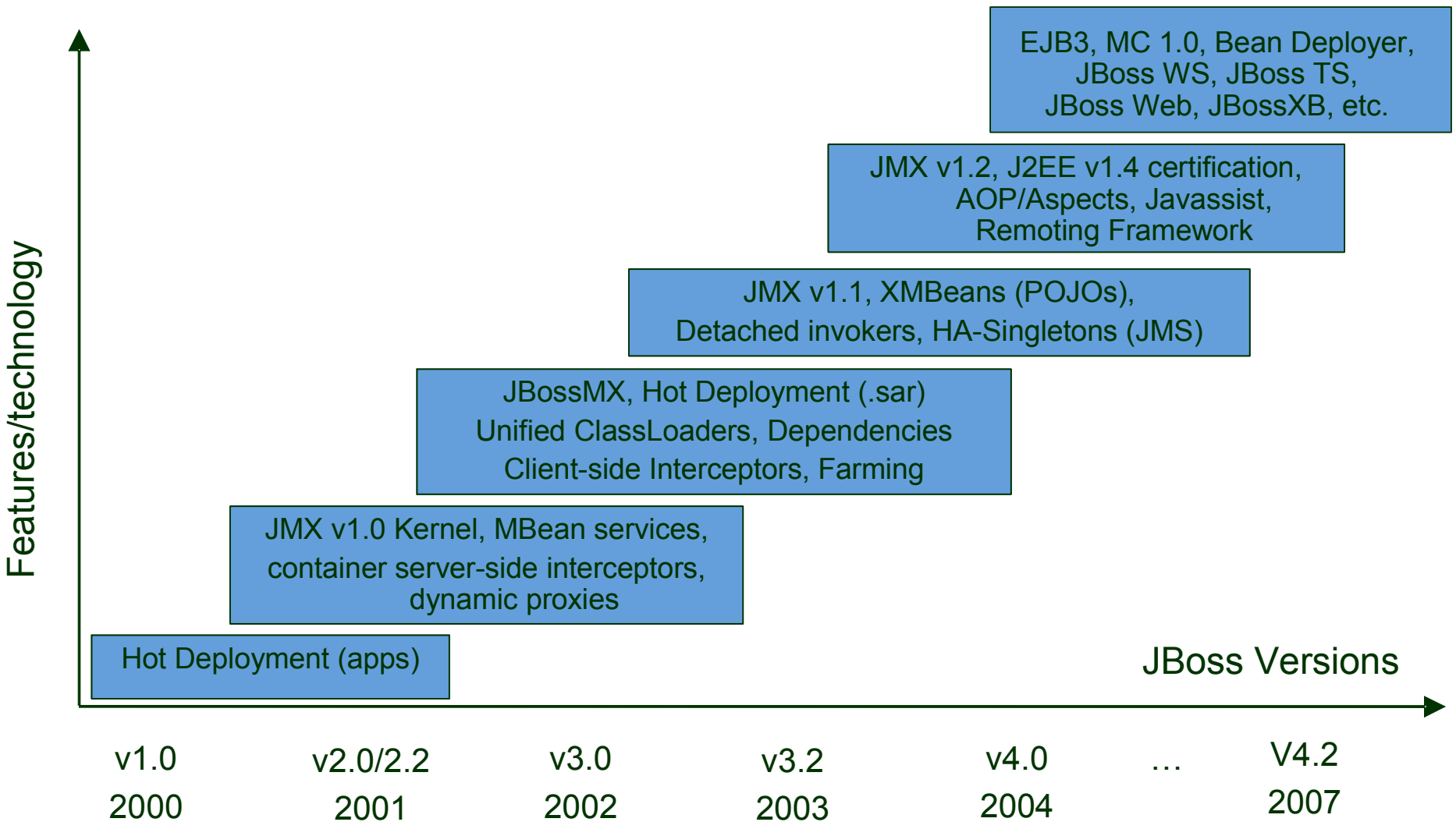
JBoss
a division of Red Hat

Agenda

- A History of Innovation
- AS 5 Goals
- Why do we need this? Where is the market heading towards?
- AS 5 Kernel Overview
- New Feature Highlights
- Q&A

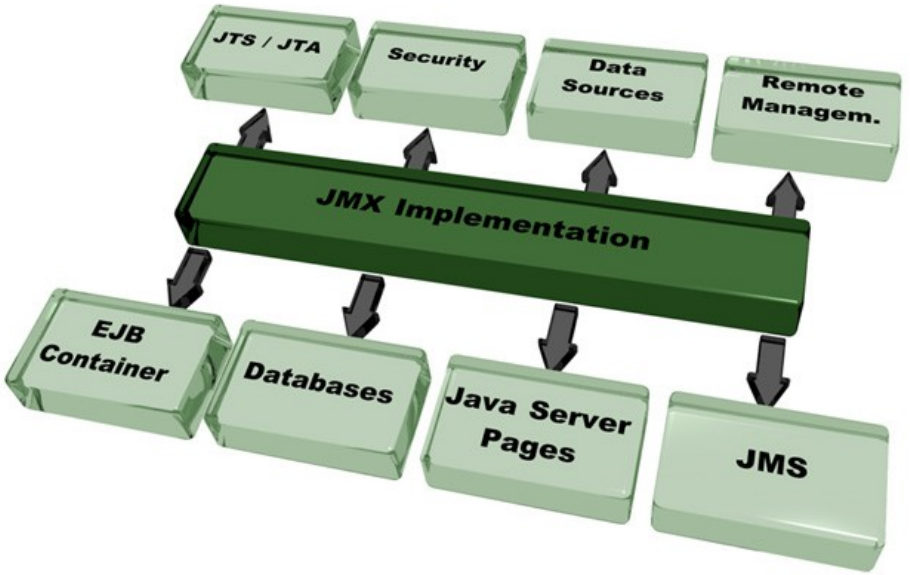
A History of Innovation

JBoss AS History



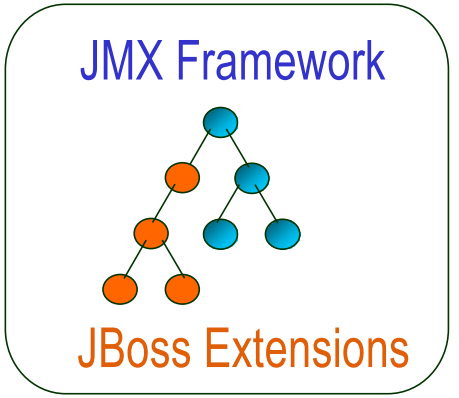
Architectural Innovations

- The JBoss Kernel
  - A lightweight component framework that wires together a set of Services.
  - Services are de-coupled, invocations are routed through an internal bus.



JMX MicroKernel – Pros (JBoss AS 3.x/4.x)

- Hijacking JMX as the basis for the JBoss Kernel was a brilliant idea, at the time:
  - Extending the server was very easy
  - A big part was already implemented
  - Get JMX management for free.



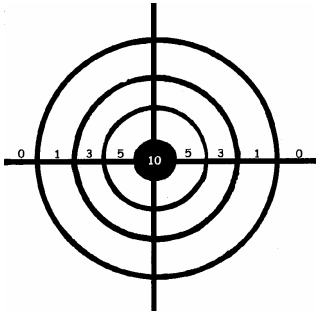
JBoss MicroKernel

JMX MicroKernel – Cons (JBoss AS 3.x/4.x)

- No native support for POJOs
- No configuration API
  - Difficult to persist configuration changes
  - Difficult to provide advanced tool support
- Ad-hoc extensibility
  - Implicit/hidden dependencies
  - Few clean internal APIs/SPIs
- Runtime Embedability
  - JMX Dependency and limited environments (e.g. J2ME)
  - No standalone project

AS 5 Goals

JBoss
a division of Red Hat



JBoss AS 5 Goals (1)

- Deliver a Java EE 5 certified application server

- Take every major subsystem to the next level
  - Clustering Infrastructure
  - Messaging Service
  - Security Modules
  - Transaction Manager
  - Web Services Stack
  - Web Server
  - ...

JBoss
a division of Red Hat

JBoss AS 5 Goals (2)

- Create the most advanced server runtime architecture
  - Next Generation POJO-based Kernel (Microcontainer)
    - Small, Standalone, Embeddable, Testable
  - New Aspectized Deployers
  - New Configuration API (Profile Service)
  - New Classloading architecture
  - Support for many component models
    - Legacy JMX MBean Services
    - OSGi bundles
    - Other...

JBoss®
a division of Red Hat

Why do we need this?

-

Where is the EE market heading towards?

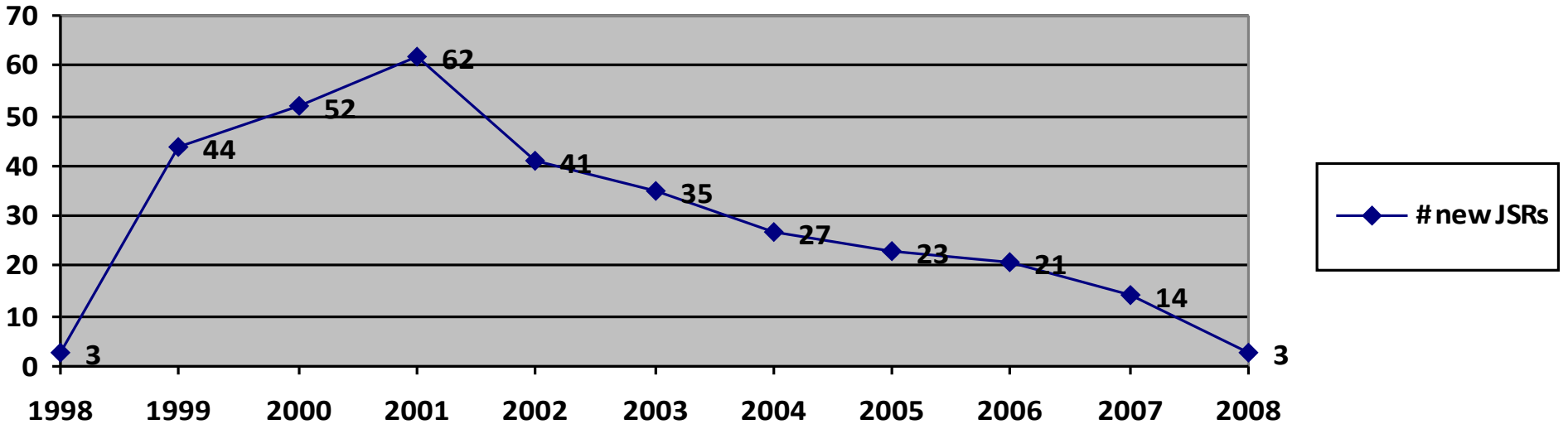
JBoss a division of Red Hat

Number of EE vendors - Consolidation

- Let's look at the numbers:
  - J2EE 1.2 : 18 vendors
  - J2EE 1.3 : 22 vendors
  - J2EE 1.4 : 17 vendors
  - EE 5 : 10 vendors
    - Actually IBM, ORCL, SUN, SAP, NEC + Kingdee, TMaxSoft
  - EE 6: ?
- More consolidation, less choice.
  - “True” vendors: Red Hat, IBM, Oracle (& SUN)

Consolidation – Less Open Standards

- Number of new JSR started on the JCP



JBoss a division of Red Hat

Consolidation – Less Open Standards

- Do vendors benefit from Open Standards in a consolidated market?
  - No, not really:
    - Common playing field? No market share to win
    - Ease Migrations? Certainly not.
    - Enhance competition? No, this leads to lower margins

=> Incentive for vendors to push Open Standards is low on a consolidated market

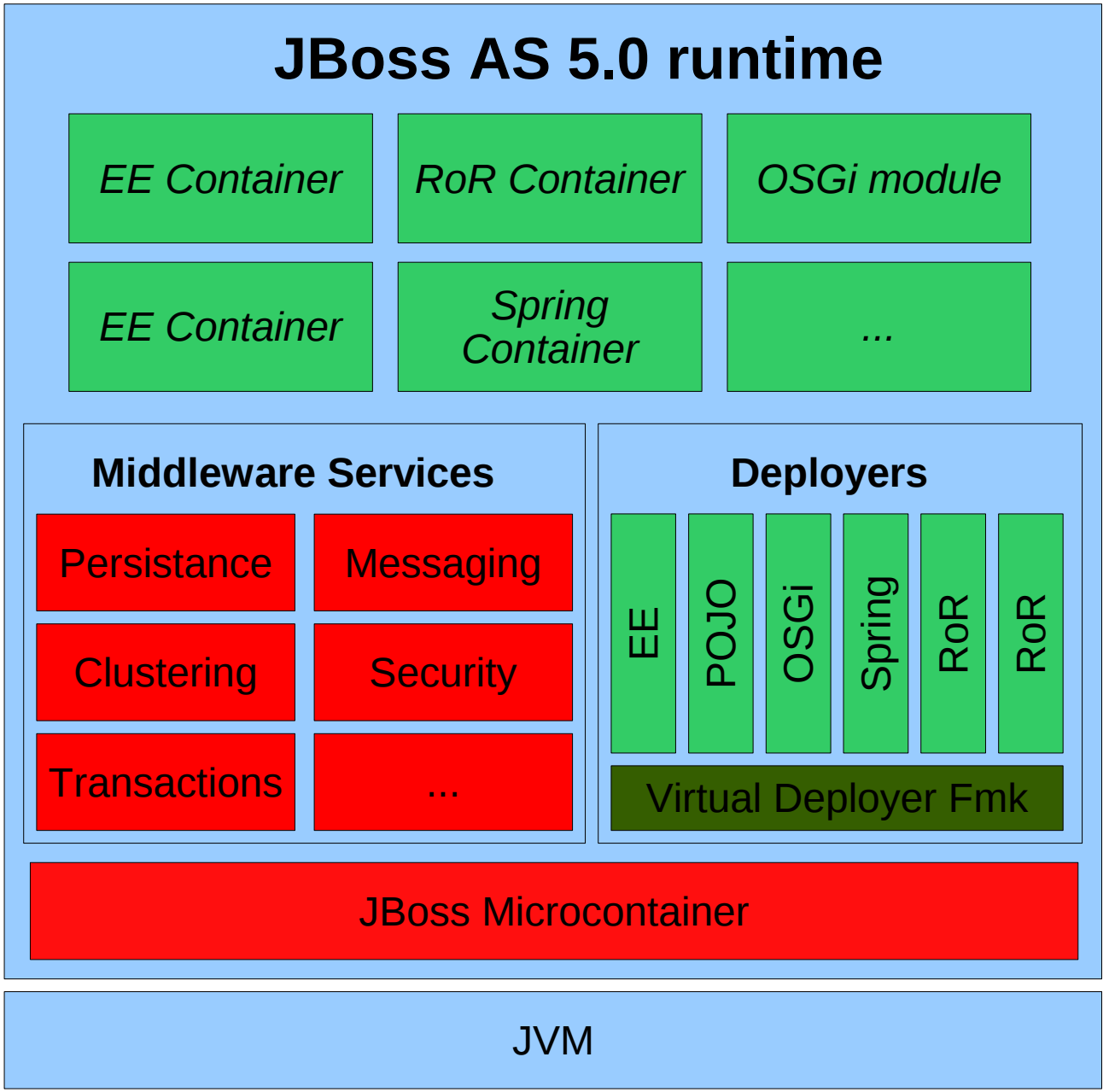
=> Most FOSS models **do** benefit from Open Standards

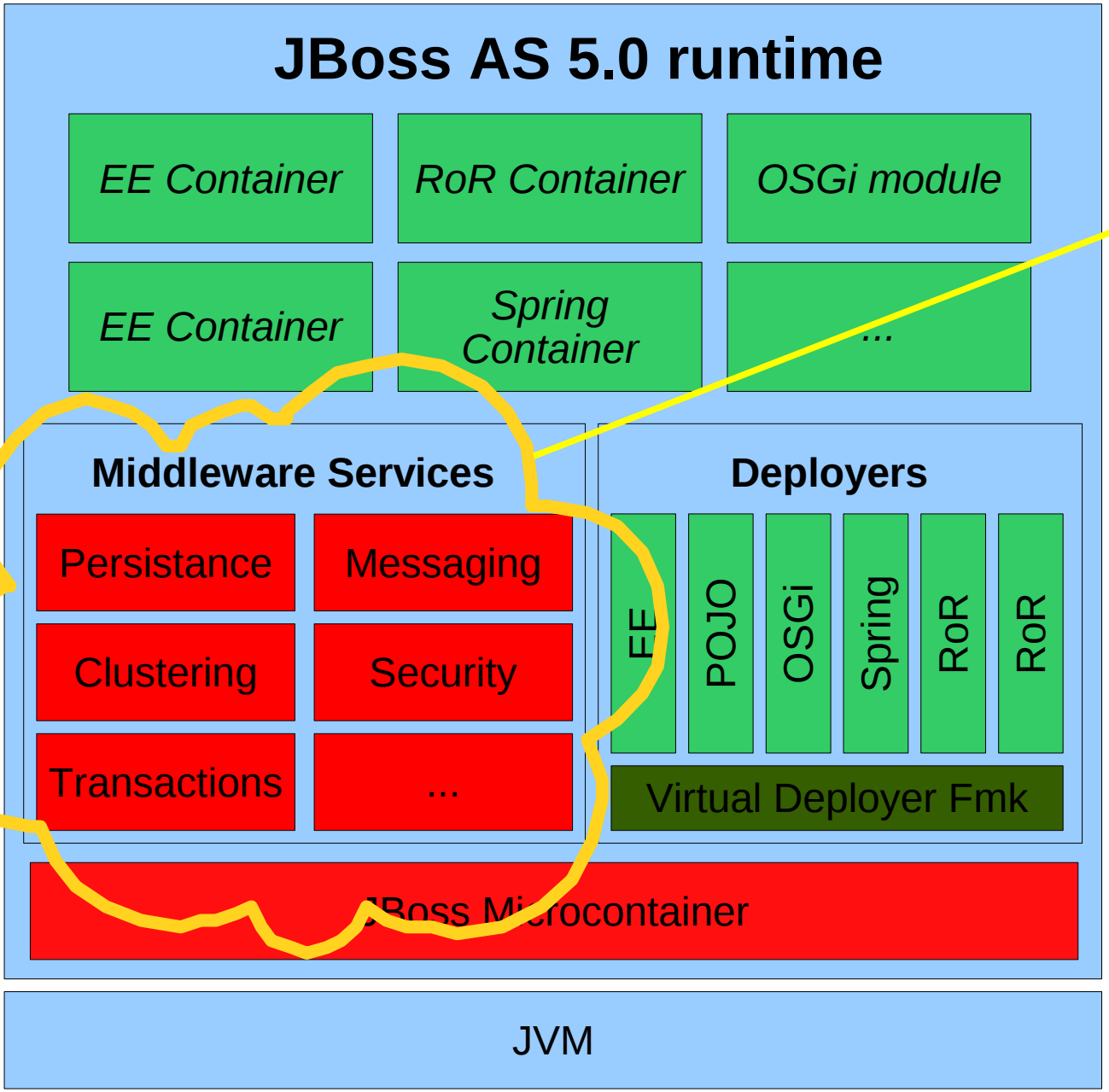
JBoss
a division of Red Hat

Where are we heading towards?

1) We are OPEN
2) We are ENTERPRISE READY
3) We have a NEXT.GEN architecture

(And will remain so.)


JBoss AS 5.0 runtime
EE Container
RoR Container
OSGi module
EE Container
Spring Container
...
Middleware Services
Persistance
Messaging
Clustering
Security
Transactions
...
Deployers
EE
POJO
OSGi
Spring
RoR
RoR
Virtual Deployer Fmk
JBoss Microcontainer
JVM



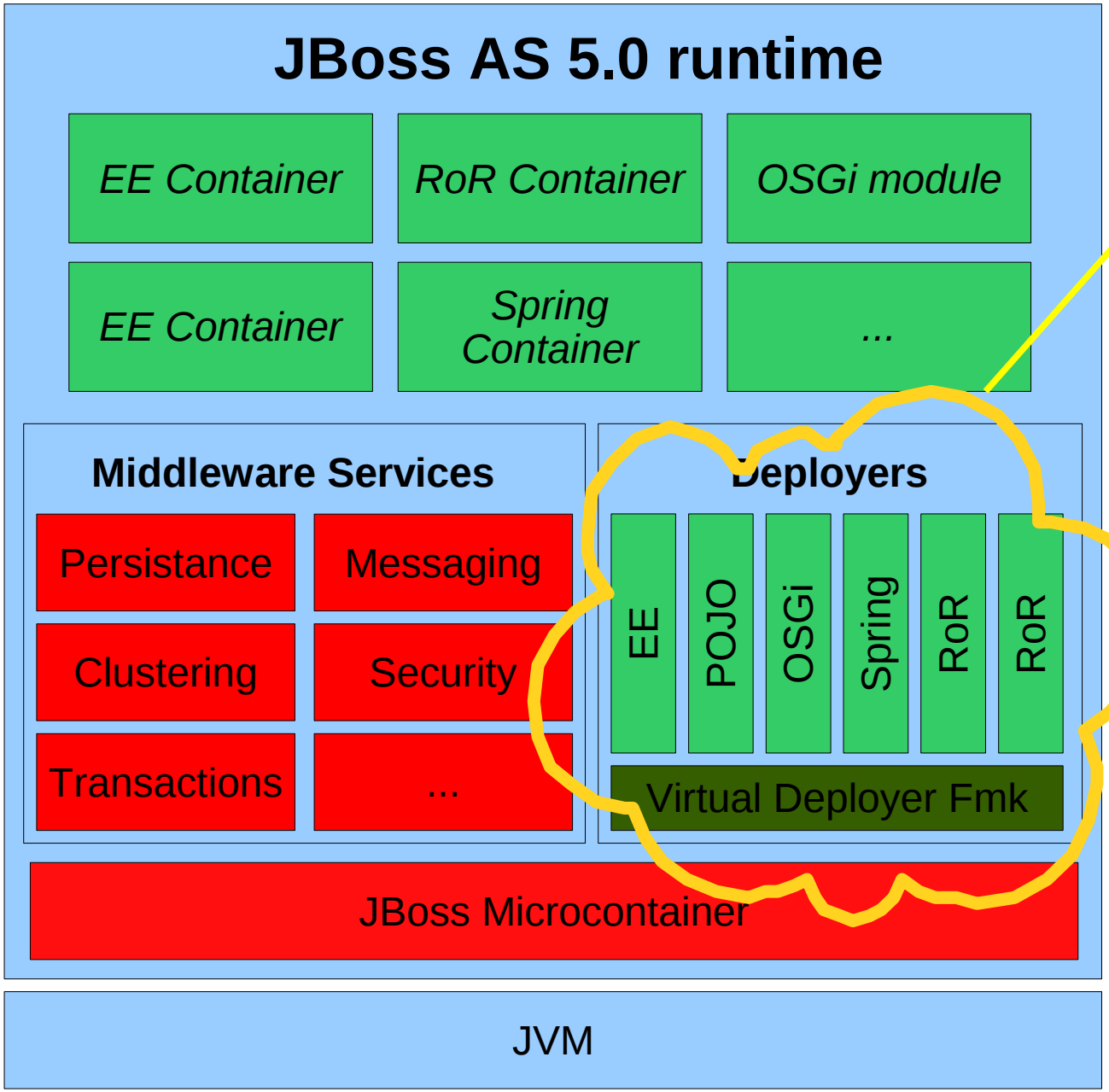
Core Middleware Services will remain!

-

That is our DNA

-

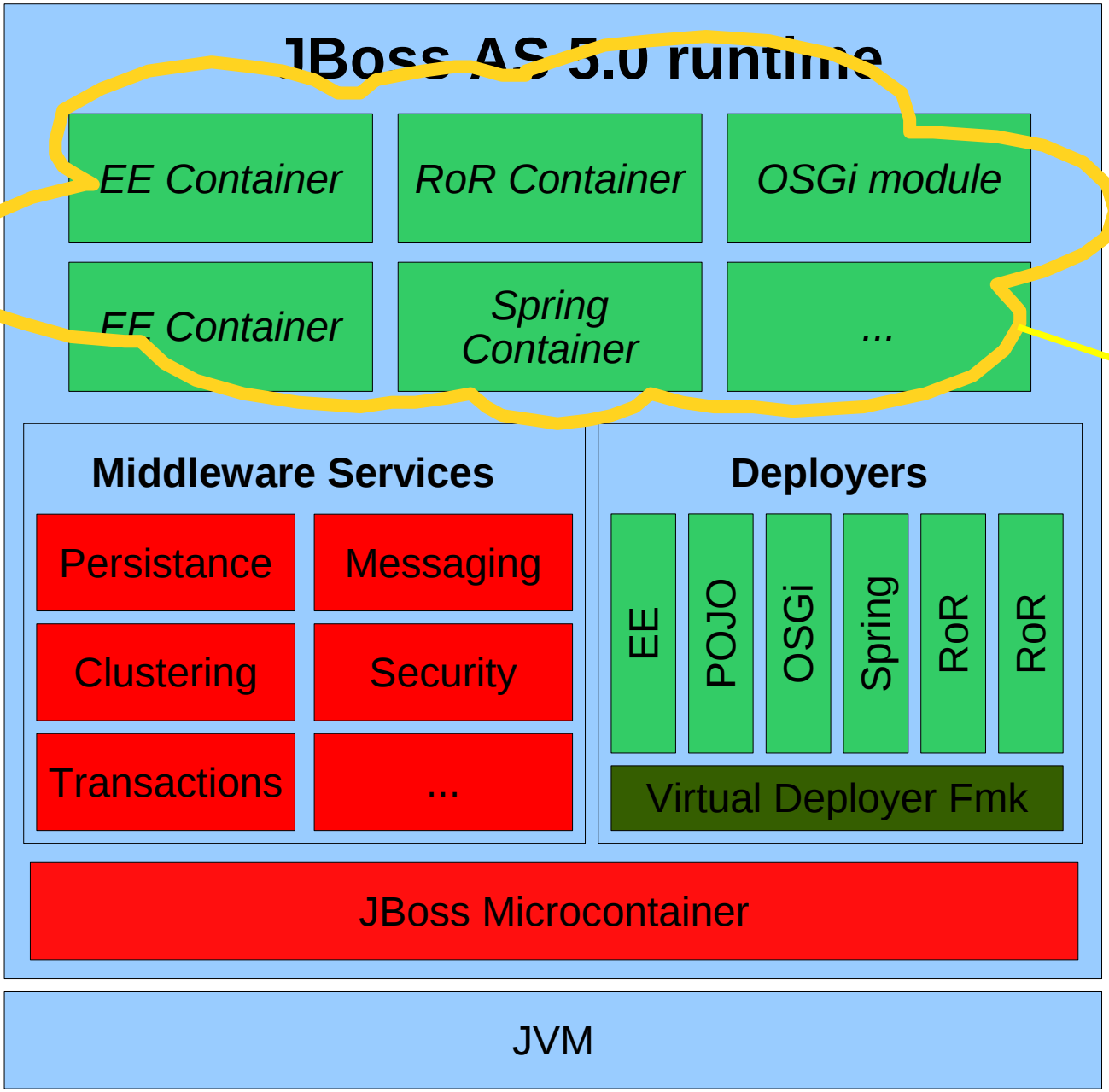
Those services have to be rock solid and feature-rich.



What is your programming model? EE? RoR? OSGi? Spring? Multiple of those?

-

Deployers map programming model specific containers to core middleware services



This is the "easiest" part in middleware

-

We shouldn't be imposing a choice here

Next.Gen JBoss architecture (not just AS)

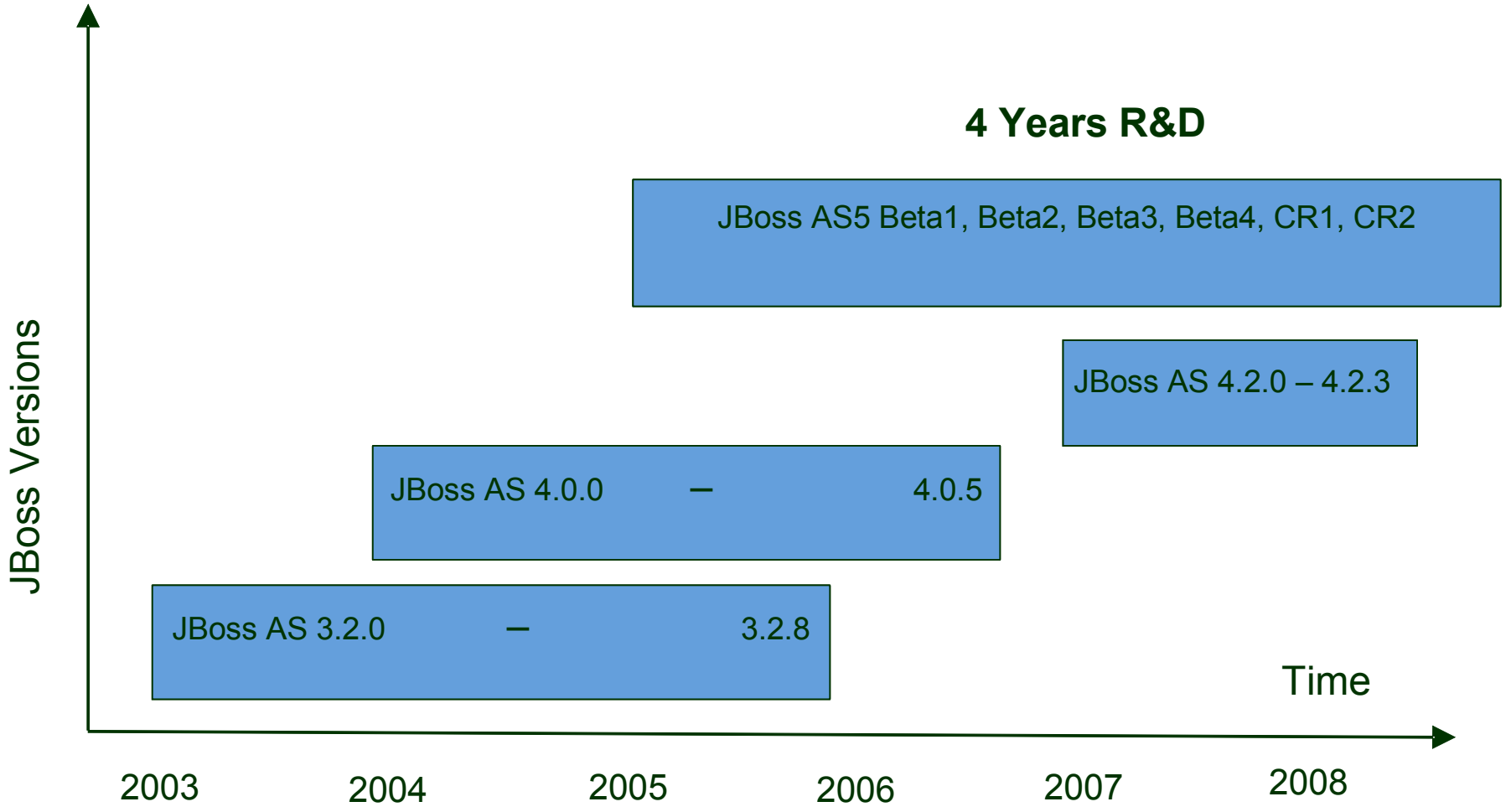
- Offer the most stable and most powerful enterprise middleware services
- Provide a flexible and powerful foundation (MC) to orchestrate these services
- Trivial to implement new programming model/API
  - No change in operations, testing of core services, interoperability, etc.

Long term sustainability of your investment.

AS 4.2 vs. AS 5.0

Smooth Migration

AS 5 Timeline



JBoss
a division of Red Hat

JBoss AS 4.2

- Stepping Stone from AS 4.x to 5.x
- Bundles AS5 features on top of the 4.x MicroKernel
  - JBoss EJB3
  - JBoss Web 2.x
  - JBoss Transactions v4.2
  - JBoss WS
  - Dependencies aligned with JBoss Messaging

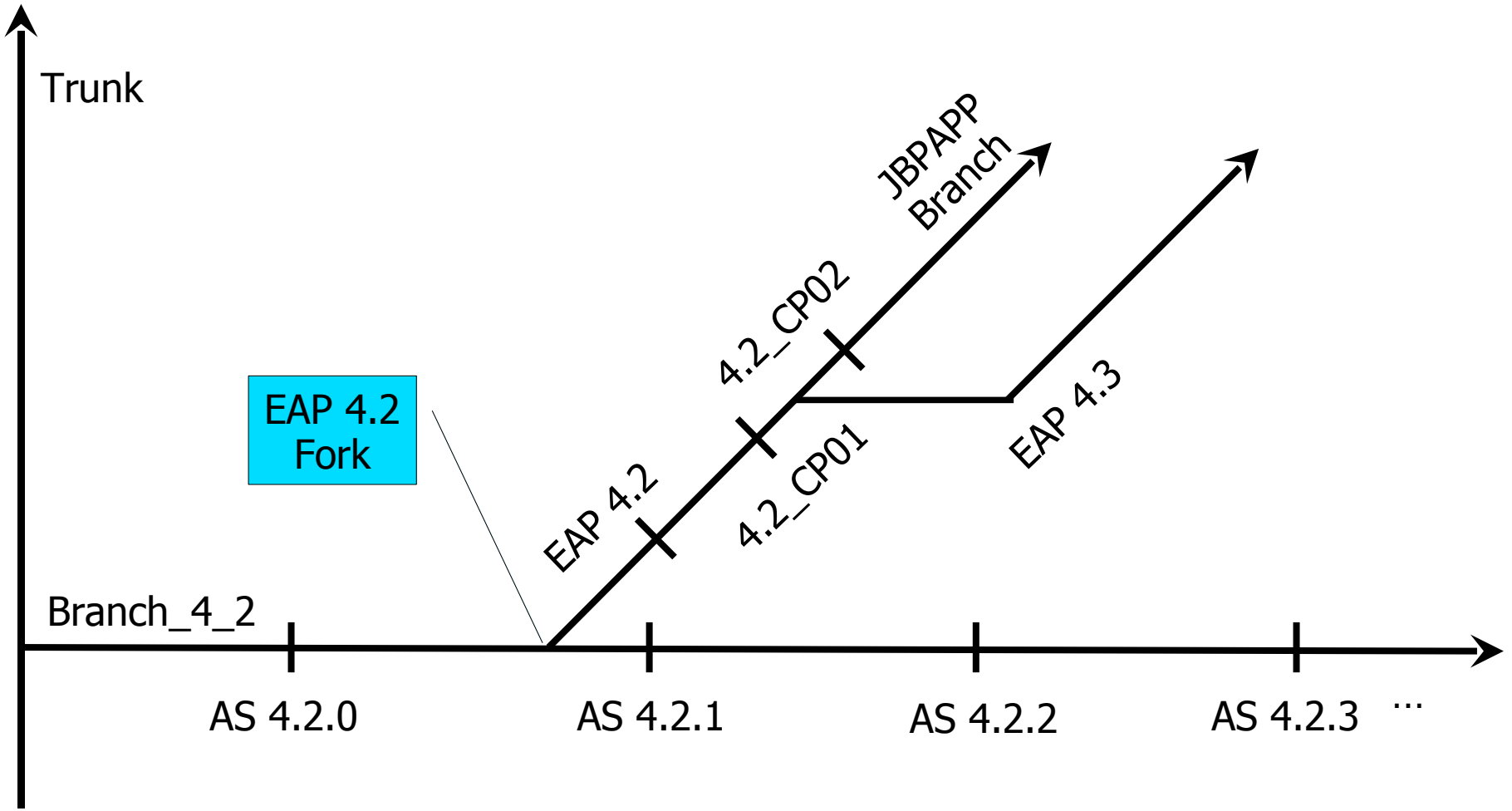
- Basis of JBoss Enterprise Platform

The Community JBoss Application Server (AS) vs. the Enterprise Application Platform (EAP)

- A Fedora/RHEL type of split for JBoss
- Community Project (JBoss AS)
  - JBoss As We Know It
  - Sponsored by JBoss/Red Hat
  - Allow innovation at a faster pace

- Enterprise Application Platform (EAP)
  - Forks the community project at stable points
  - Integrates with JBoss Developer Studio / JBoss Operations Network
  - Rigorously tested (performance, scalability, SpecJ, etc.)
  - Certified on 17 OS and JVM combinations, 5 DBs
  - 3 month Cumulative Patch cycles
  - Supported for 5 years.

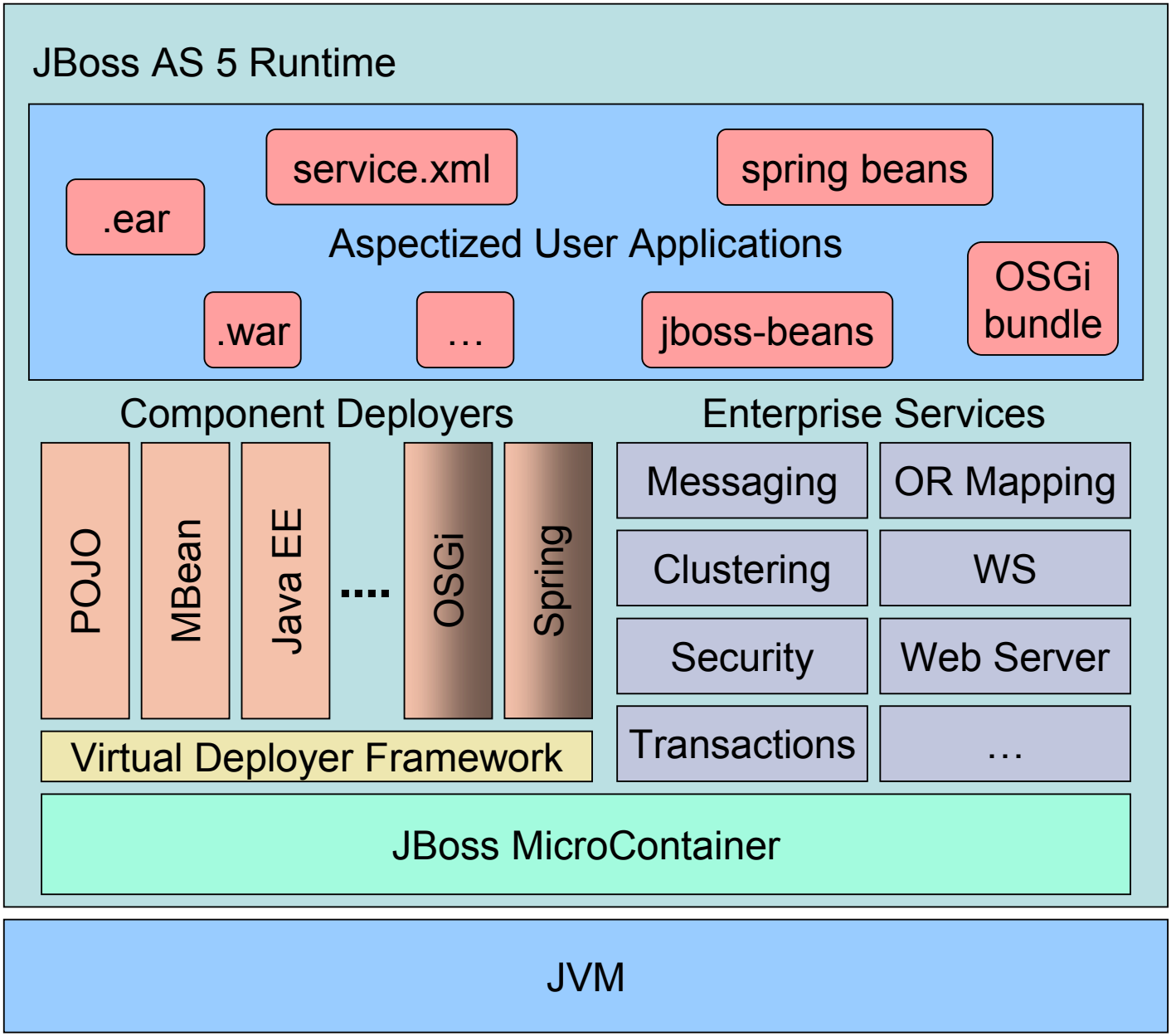
Forking EAP from JBoss AS



AS 5 Kernel Overview

The Big Picture

Runtime components wired together by the MC with dependencies and aspects applied across component models!



JBoss
a division of Red Hat

JBoss Microcontainer Core

- Dependency Module
  - An extensible State Machine (states, transitions, controller, callbacks)
- Container Module – Basic IoC
  - Object/Class (scoped) Metadata, Introspecition / Reflection, Aspectization
- Kernel Module – Advanced IoC
  - Controller Modes: Auto, Manual, On-Demand
  - Deployer Install / Uninstall
  - Annotations
  - Classloaders
  - ...

JBoss Virtual File System (VFS)

- An read-only Archive abstraction for the Deployers, starting from a root URI/URL
  - Zipped vs Exploded archives
  - Nested archive
- Can create “virtual” archives in memory
  - Great for unit testing

```
...
AssembledDirectory jar =
AssembledContextFactory.getInstance().create("ejbTestCase.jar");
jar.addClass(Customer.class);
jar.addClass(CustomerDAOBean.class);
jar.addClass(CustomerDAOLocal.class);
jar.addClass(CustomerDAORemote.class);
jar.mkdir("META-INF").addResource("tutorial-persistence.xml",
"persistence.xml");
Bootstrap.getInstance().deploy(jar);
```

Notable differences

- JBOSS_HOME
  - lib/
  - common/lib/ - **NEW**
  - server/*config-name*/lib
- Configurations
  - minimal
  - web - **NEW**
  - default
  - all
  - [standard] - **NEW**

Deployer Types

- **Structural Deployers**
  - Recognise deployment types
    - User defined – META-INF/jboss-structure.xml
    - Specification defined – jar, war, ear, etc.
  - Defines the structure
    - Where is the metadata? META-INF or WEB-INF, etc.
    - Where are the classes? / or WEB-INF/classes, etc.
    - What are the subdeployments?
- **Aspectized Deployers**
  - Each Deployer does one thing well
  - Easy to control how much gets done
    - Off-line tool like the admin console only wants to do parsing
    - Runtime does everything
  - Easy to swap out behaviour – e.g. change the classloader

Aspectized Deployers

- **Parsing Deployers**
  - Turns xml into a metadata model attachment
  - e.g. my-beans.xml -> KernelDeployment
- **ClassLoading Deployers**
  - Creates classloaders from metadata
  - e.g. Uses the information from the StructureDeployers
- **Component Deployers**
  - Splits complicated deployments into units
  - e.g. KernelDeployment -> BeanMetaDatas
- **Real Deployers**
  - Does the real work of deployment
  - e.g. BeanMetaData -> controller.install()

JBoss a division of Red Hat

OSGi support

- Core OSGi Framework API
  - A Facade on top of the existing Microcontainer API
  - OSGi Bundle Repository (OBR)
  - Declarative Services Support (DSS)
  - Service Registry
- NIH Syndrome?
  - We want full integration with the MC runtime:
    - AOP
    - Metadata
    - VFS
    - Legacy JMX
    - Fine grained dependencies

JBoss a division of Red Hat

oddthesis jboss.org

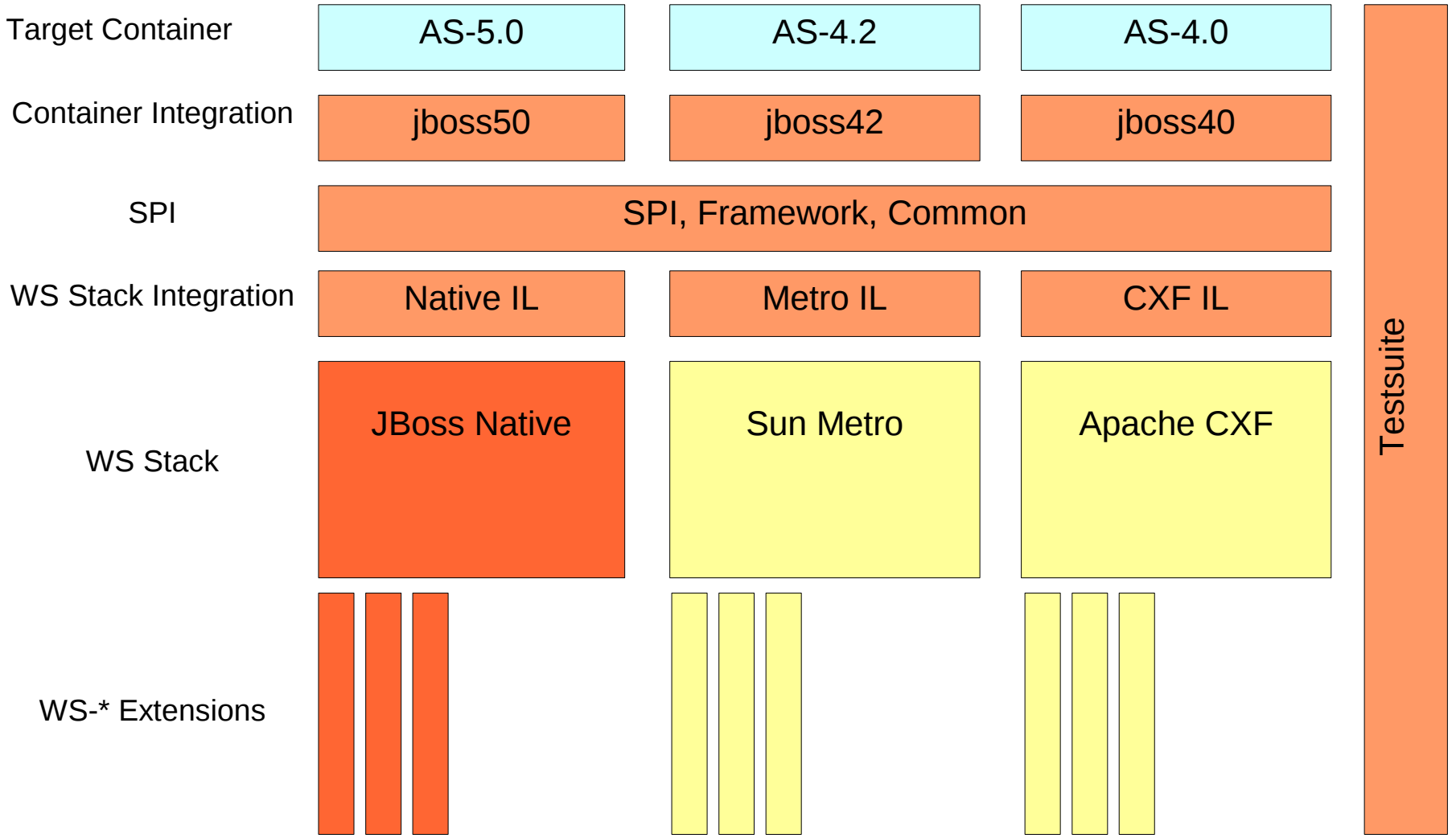
Bob McWhirter's

- Rails on...
- Jboss-Rails deployer on...
- JBoss AS5 CR2, on...
- RHEL 4, on...
- A virtual appliance

- Demo?

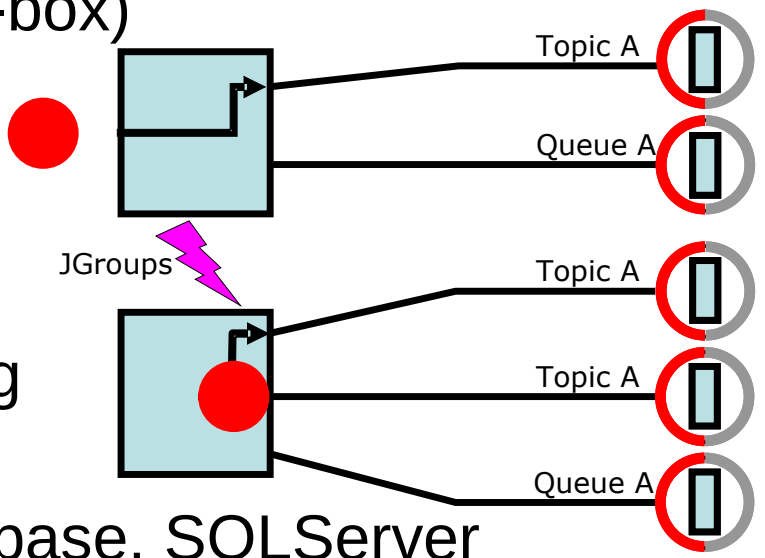
Feature Highlights

JBossWS 3.0.4


Target Container
AS-5.0
AS-4.2
AS-4.0
Container Integration
jboss50
jboss42
jboss40
SPI
SPI, Framework, Common
WS Stack Integration
Native IL
Metro IL
CXF IL
WS Stack
JBoss Native
Sun Metro
Apache CXF
WS-* Extensions
Testsuite

AS 5 - JBoss Messaging v1.4.1 Highlights

- High Performance JMS 1.1 compliant provider (Java5 only)
- XA implementation/integration with JBoss Transactions
- Clustered Queues and Topics (out-of-the-box)
- Intelligent message redistributions
- Transparent failover
- In memory message replication
- Support for very large messages & paging
- JDBC Persistence
  Oracle, MySQL InnoDB, PostgreSQL, Sybase, SQLServer
- ... too many features to mention :-)



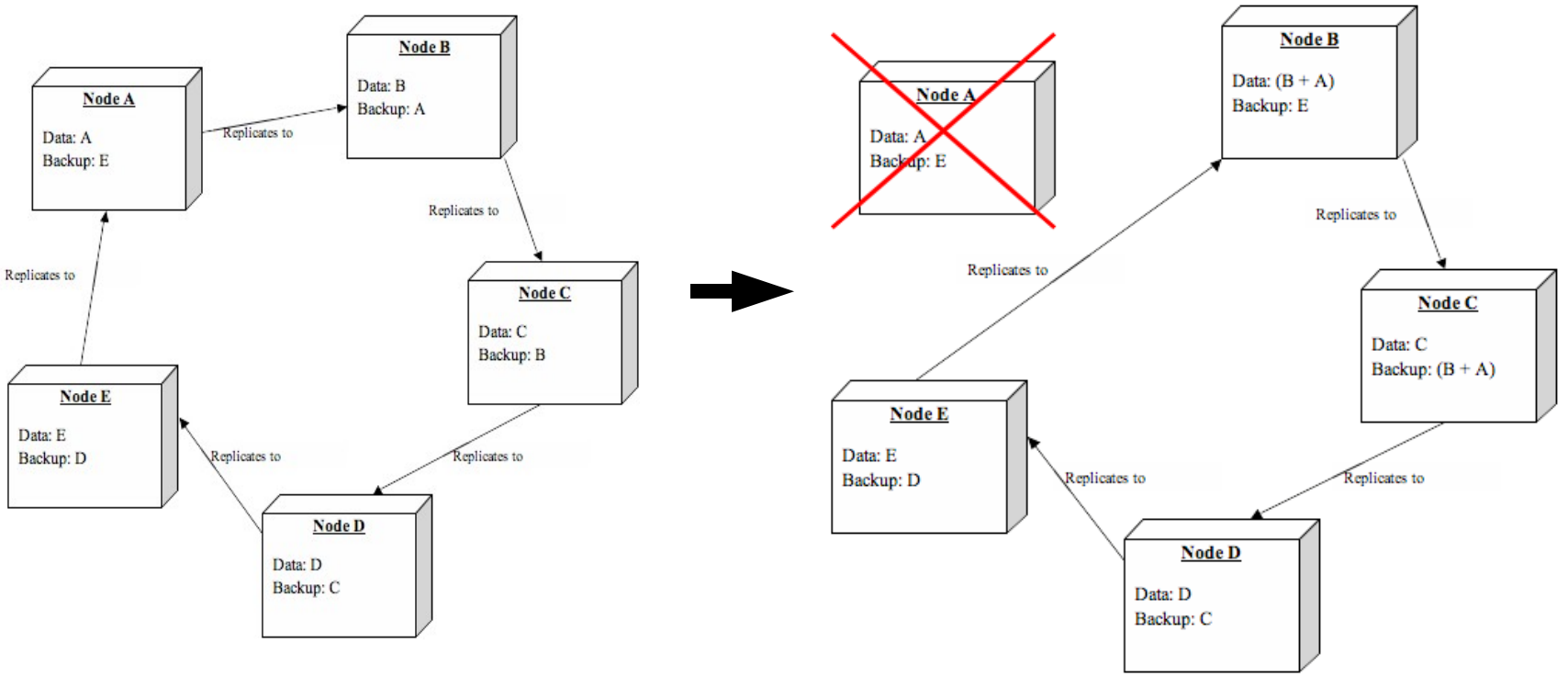
JBoss
a division of Red Hat

The Road Ahead : JBoss Messaging 2.0

- Completely JMS independent generic core.
- Bootstrappable in JBoss Microcontainer or any other dependency injection framework.
- Brand new NIO transport using Apache MINA. Supports TCP, SSL, HTTP and native APR.
- Very fast local append-only journaling store with Berkeley DB
- Improved JDBC persistence support using Hibernate
- Improved queue configuration and security
- Extended and more flexible HA

AS 5 - Clustering Highlights (JBC 3.0.0 / JGroups 2.6.7)

- Buddy replication for SFSBs
  - Replicate to a configurable # of backup nodes rather than to all other nodes
  - Improved memory, CPU, network utilization == Scalable!



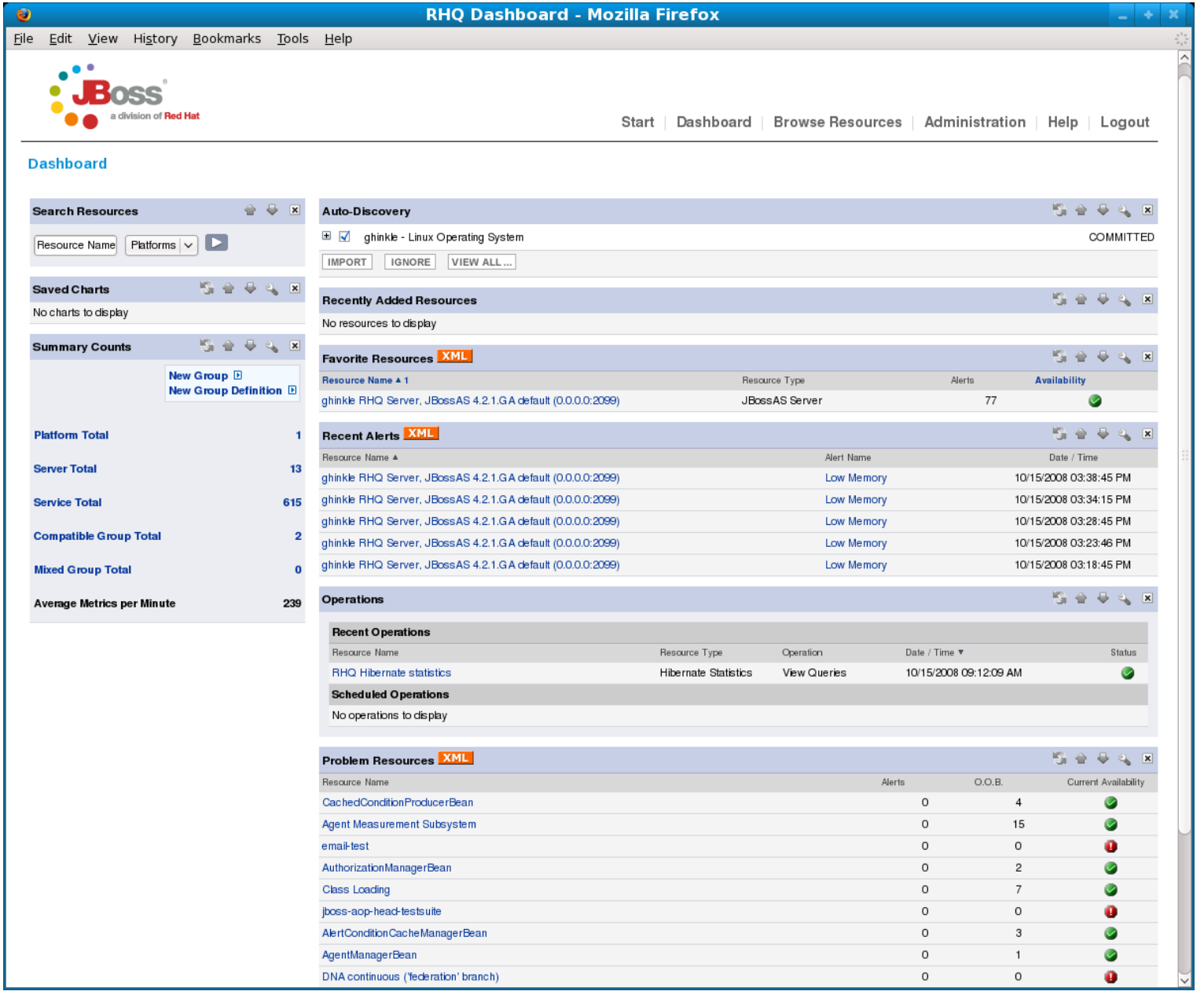
AS 5 - Clustering Highlights (JBC 3.0.0 / JGroups 2.6.7)

- Multi Version Concurrency Control (MVCC)
  - Faster access for readers/writers, smaller mem. footprint
  -
- Passivation for clustered web sessions
  - Control memory usage; overflow to disk
- Much improved EJB3 Entity/Hibernate Caching
  - Separate Entity (invalidation) / Query (replication) Caches
- Clustered messaging server (JBoss Messaging)
  - JMS server no longer an HASingleton

AS 5 – JBoss Web 2.1.1 (Tomcat 6 on Steroids!)

- JBoss' own version of Tomcat 6
- Code stability and maintenance
- Integrates with JBoss Clustering
- Run inside JBoss AS (and soon Standalone)
- High performance
  - Java Connectors over JBoss Native (over Apache APR) match Apache httpd performance
  - High concurrency (10k+ connections)
  - Static file handling (low memory/cpu usage)
  - Integrates OpenSSL (x6 - x10 performance)
  - Linux, HP-UX, Solaris, Windows
  - Just drop jboss native in JBOSS_HOME/bin/native

New Management Console - Jopr



JBoss a division of Red Hat

mod-cluster

- Dynamic configuration of httpd workers
  - Static list
  - Dynamic discovery
- Server-side load balance factor calculation
- Fine grained web-app lifecycle control

JBoss a division of Red Hat

Work-In-Progress

- EJB3 standalone
- EJB3.1 / Web Profile / Java EE 6
- Railo integration
- ...
- Document, explain, blog, experiment, test-drive, have fun and spread the word :-)

Q & A