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# Enterprise Java Hosting in a Cloud Environment

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Union Pacific Railroad  
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# Agenda

History of WebLogic and J2EE at Union Pacific (UP)

Web Architecture Review

Support Systems

Move to Spring Framework

UP's Hosting Environment Overview

Current

Future

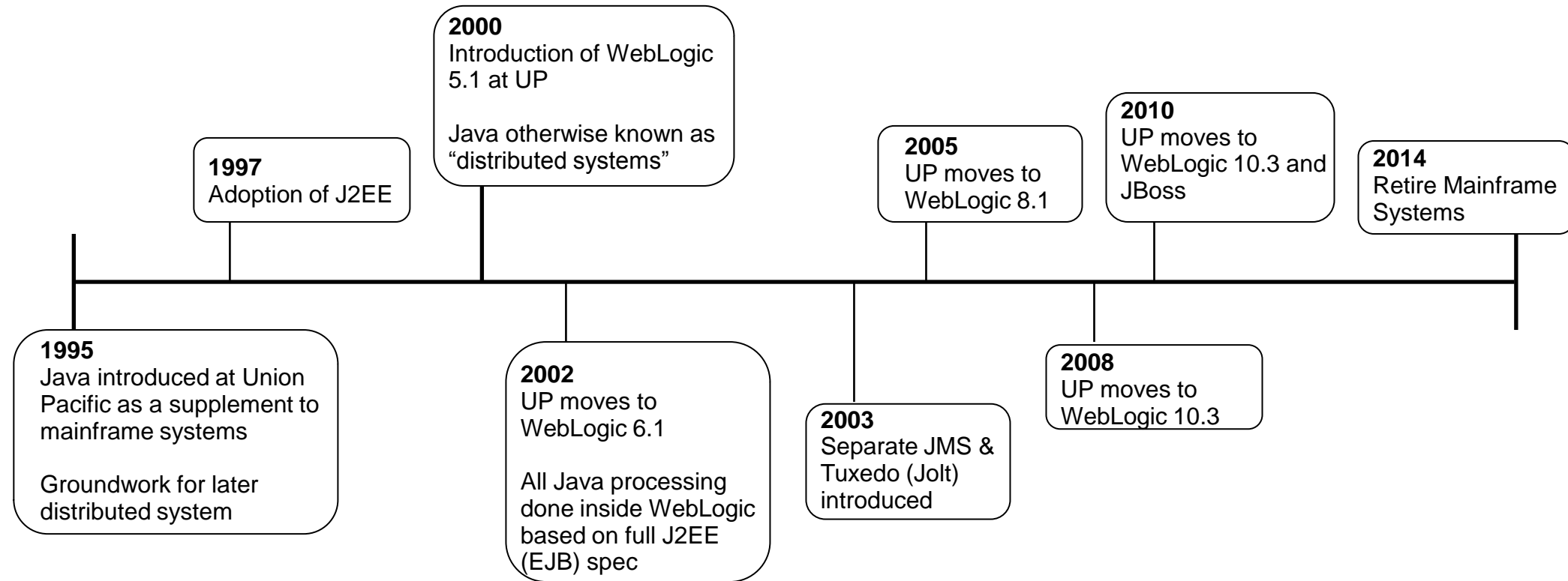
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# History of Java at Union Pacific



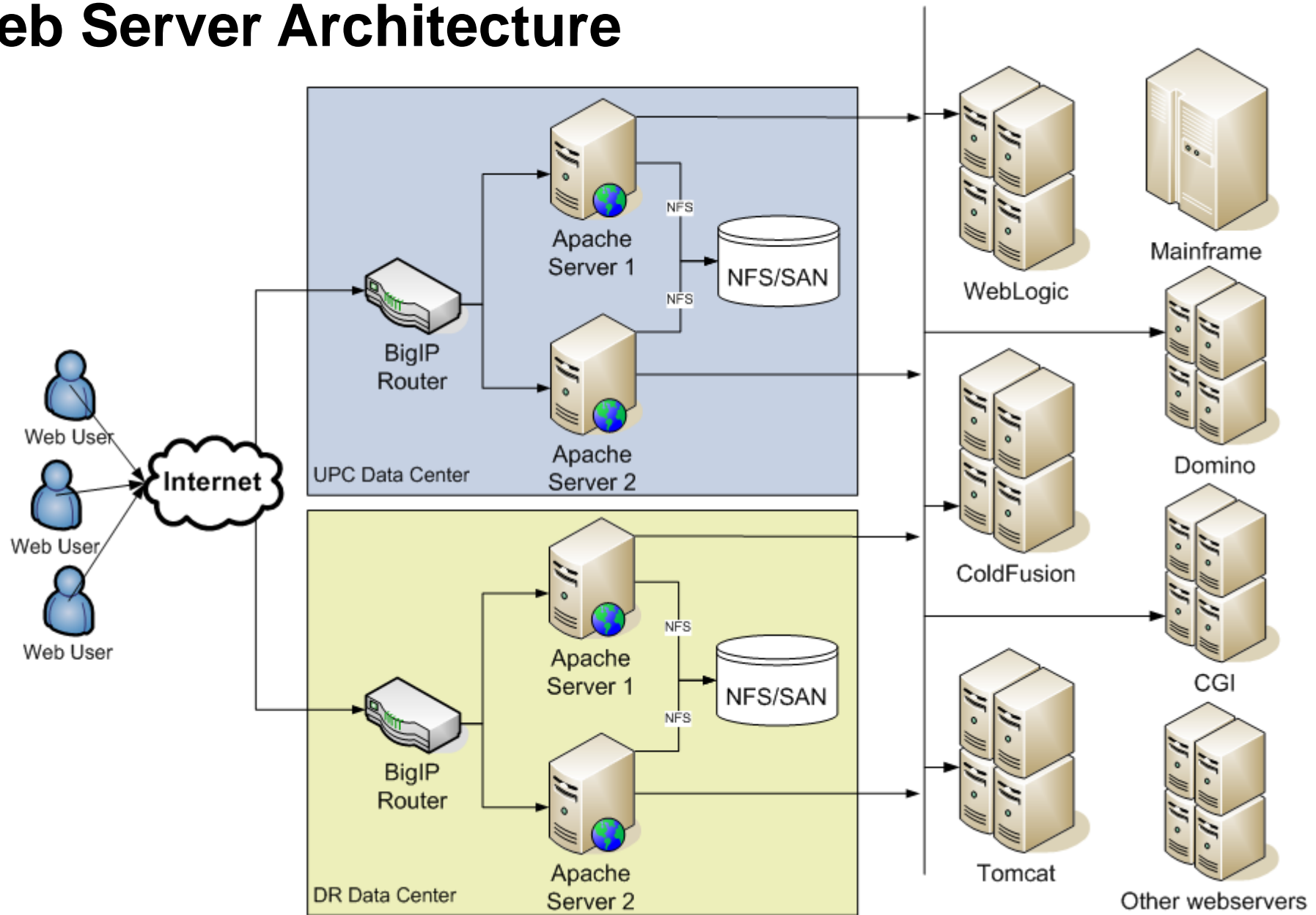
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# Web Server Architecture



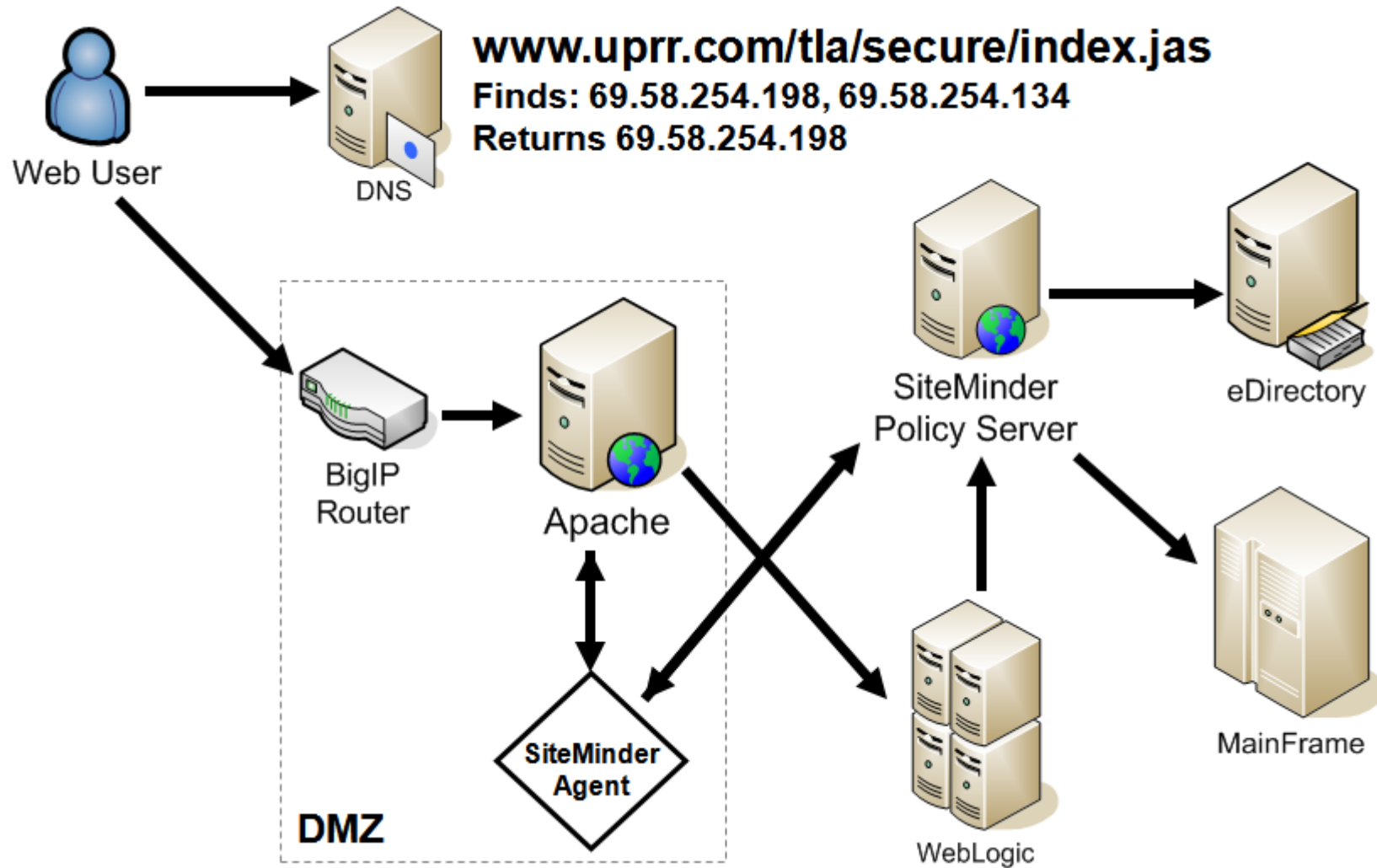
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# Web Request Trace - SiteMinder



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# Supporting Systems

Home-grown  
solution

Source Code  
Control



Security (SiteMinder  
& LDAP)

- . Each application has its own login ID



JMS

Change Control

- . Based on check-out from Subversion
- . Build/deploy to test
- . Certify in test and deploy to production

ORACLE

ESB

Monitoring  
Feeds



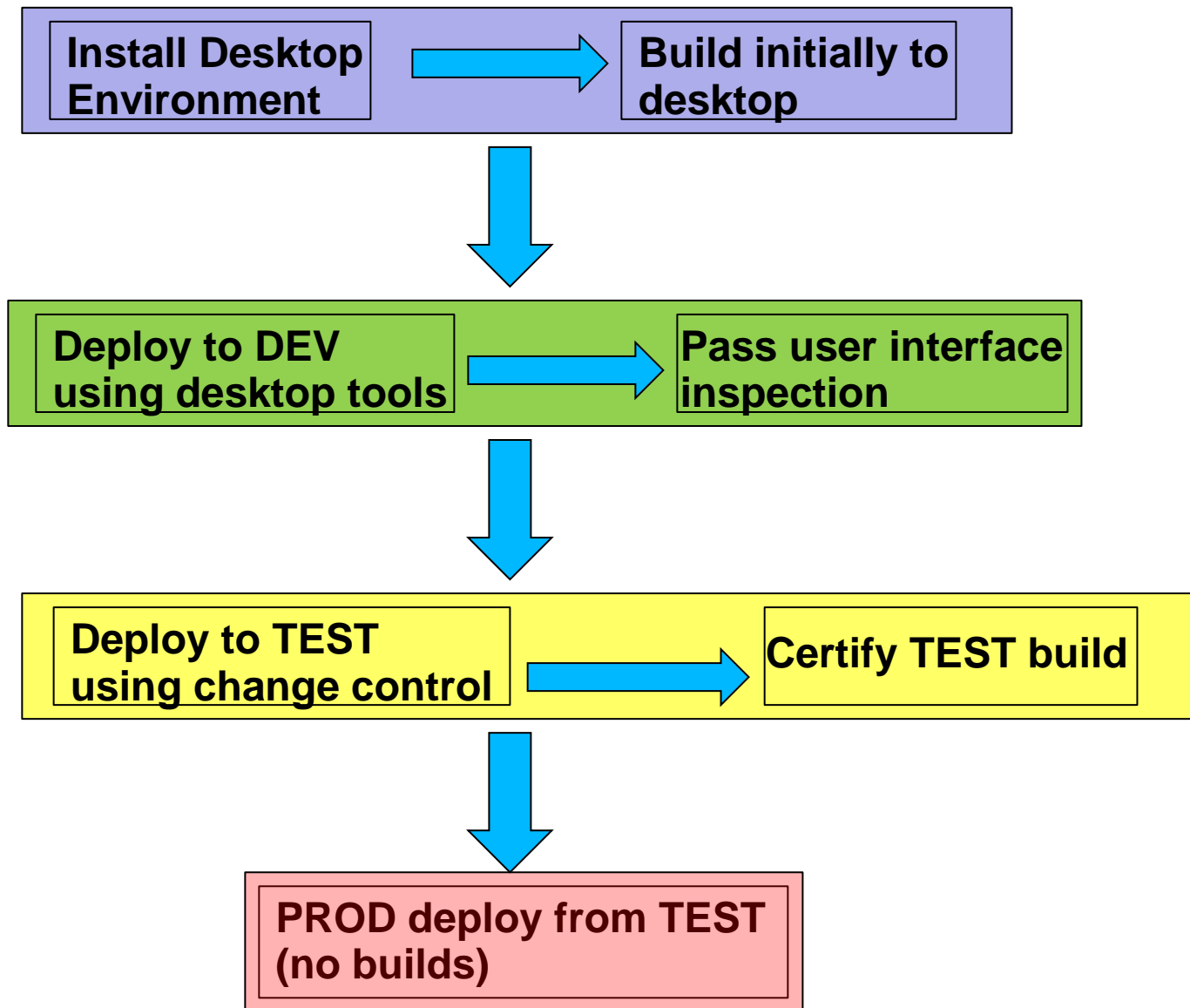
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# From Development to Production



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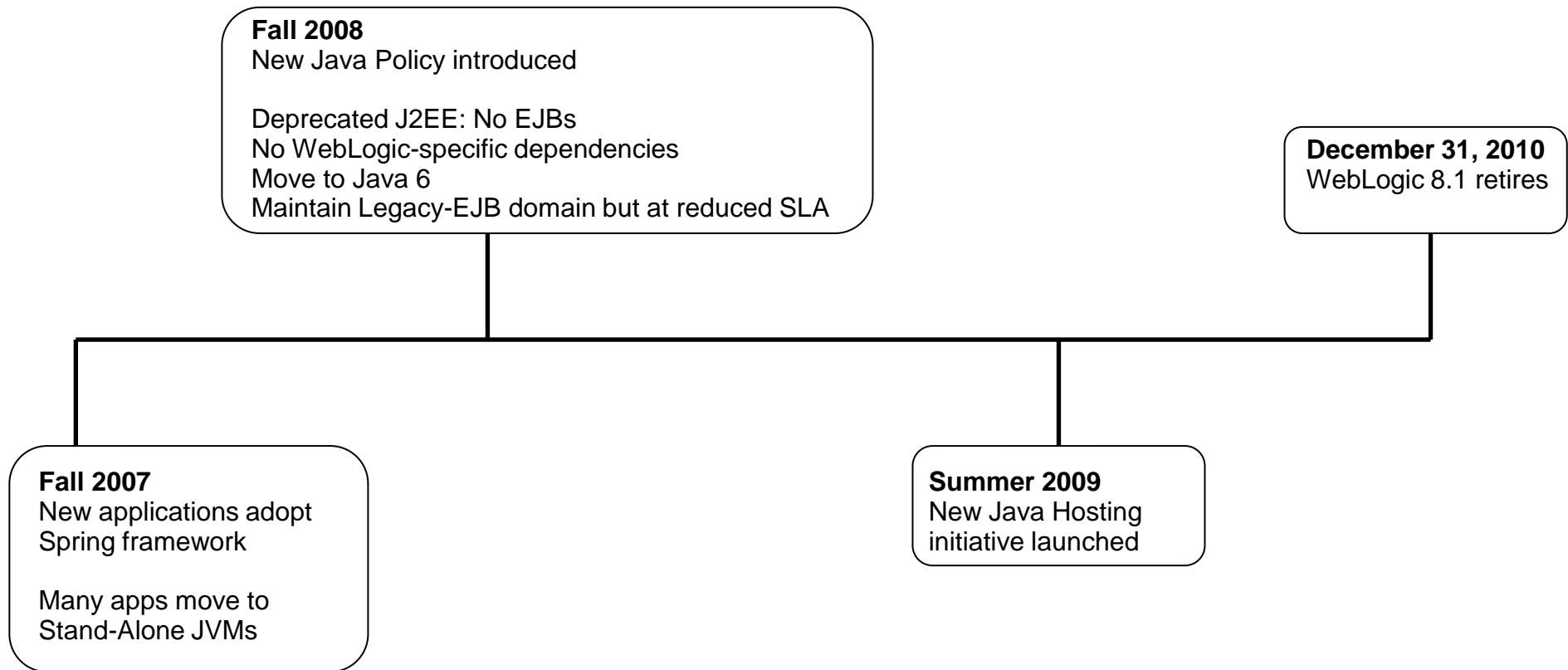
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# WebLogic and the move to 10.3 (Spring)



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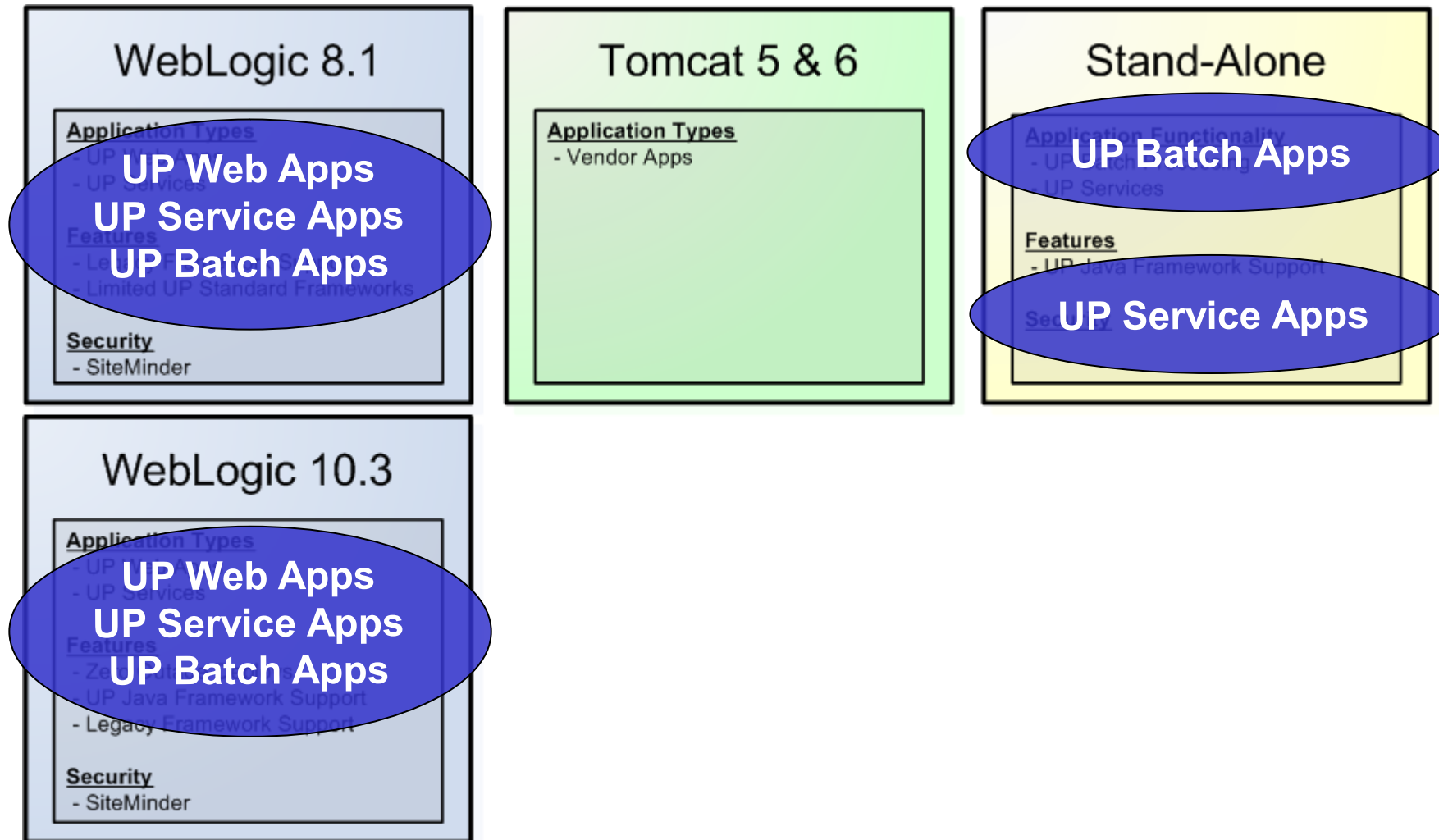
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# Current Environment

## Overview/Containers



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# Current Environment

## *Advantages & Disadvantages*

Advantages	Disadvantages
Multiple deployment options	Not isolated at hardware or application levels
Proven platform	Inefficient resource utilization
Familiar environment	No standard console management tool across development & infrastructure teams
	Costs of licensing & administration

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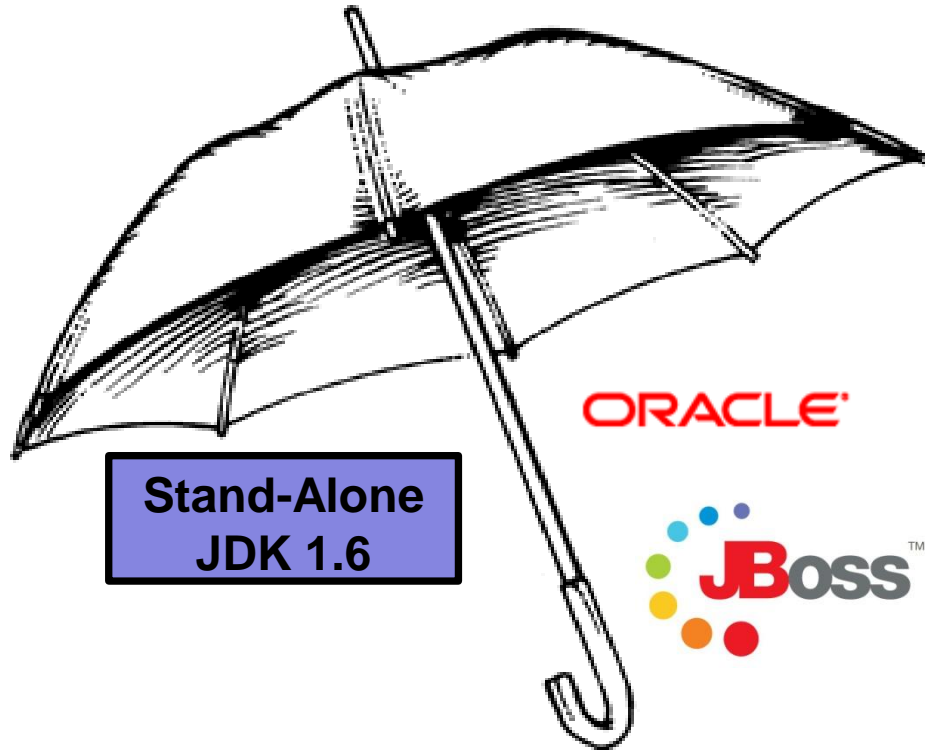
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# Java Hosting Environment (JHE)

## Overview



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# Java Hosting Environment Strategic Goals

## Flexibility

Choices for container options and hardware resources

## Standardization

Provide standardized containers, libraries, management and operational consoles, DR strategy, monitoring, logging, etc.

## Availability

Provide better application isolation, both at container and hardware level

## Cost Avoidance

Provide environment that better utilizes resources, provides more efficient supportability, and flatten growth in most expensive containers

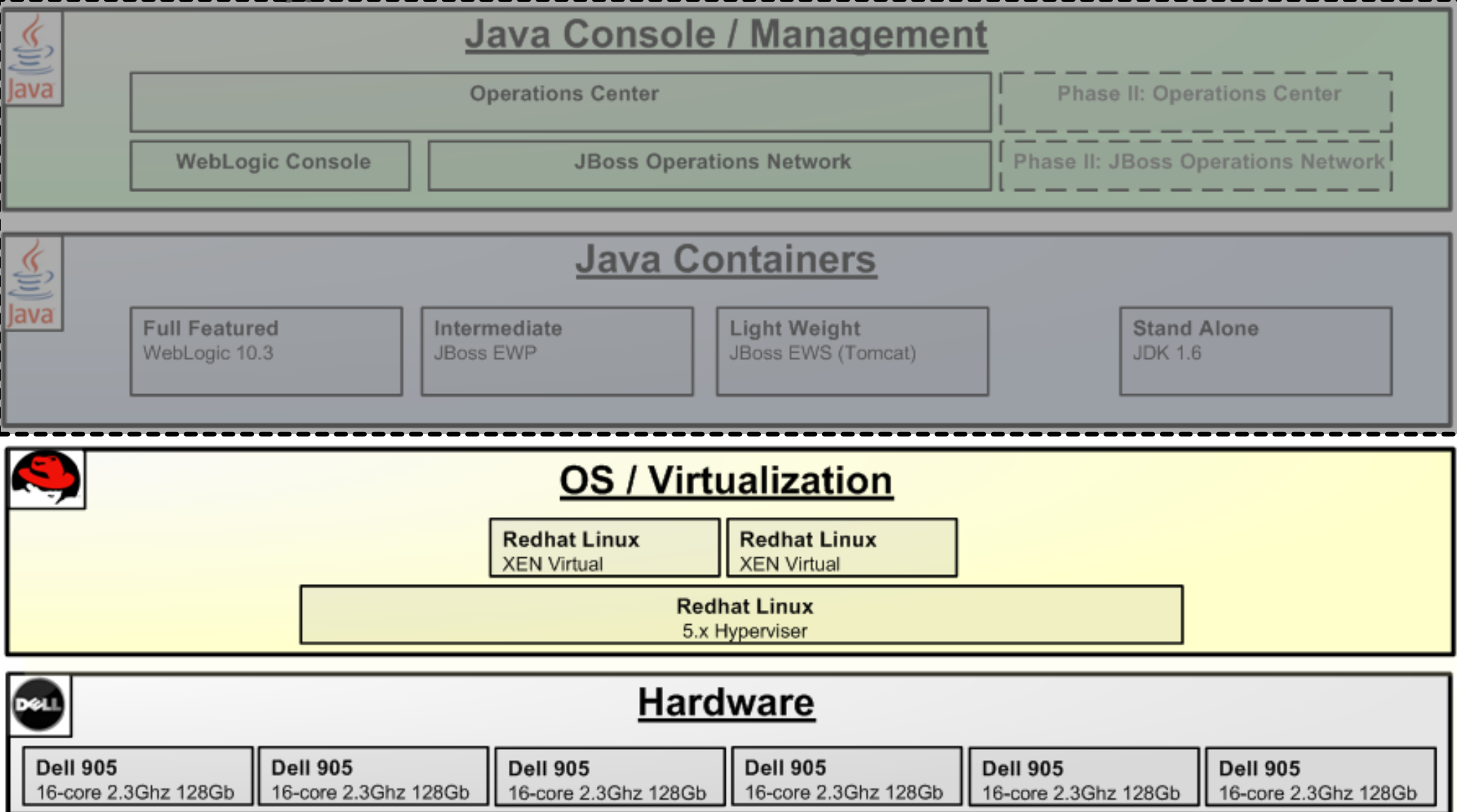
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# Java Hosting Environment Technology Stack



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# Java Hosting Environment

## *Private Cloud*

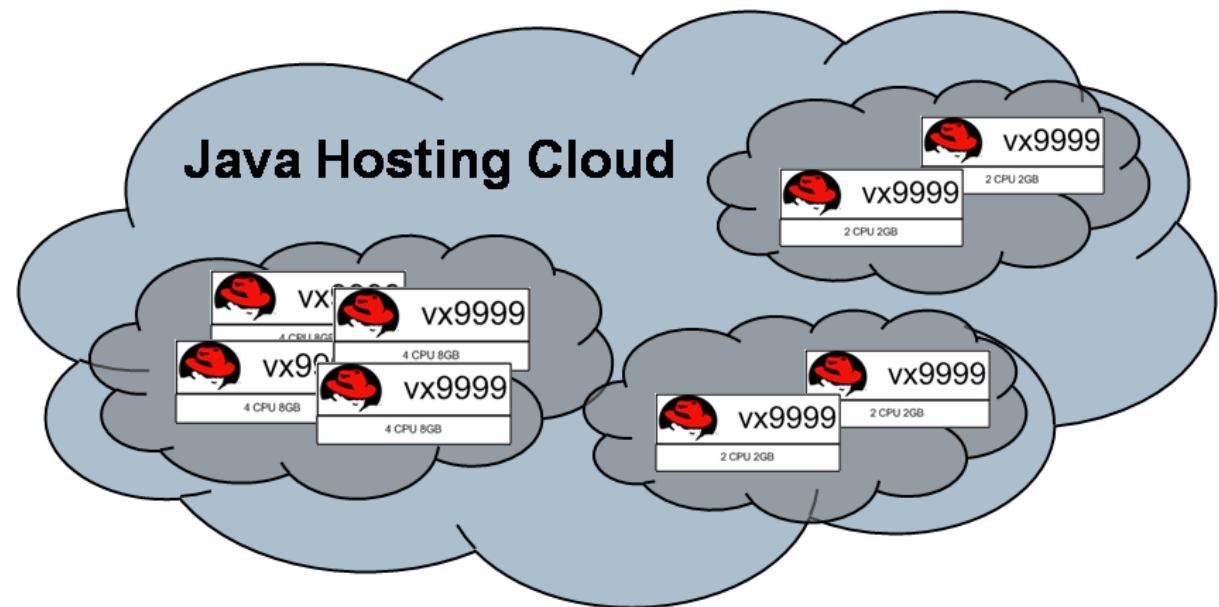
Infrastructure as a Service

RedHat Clustering & Virtualization

Platform as a Service

Java Containers

JBoss Operation Network



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# Java Hosting Environment

## *RedHat Clustering & Virtualization*

### Benefits

Increased flexibility for:

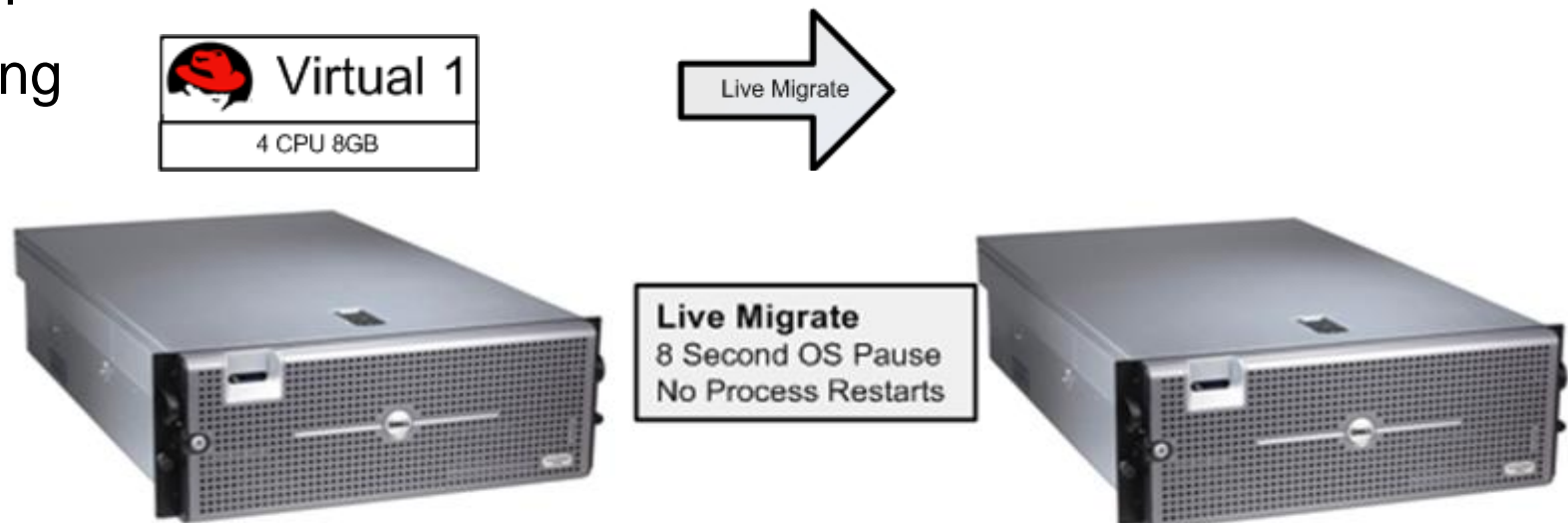
Administration

Capacity

Increased availability via:

Isolation

Clustering



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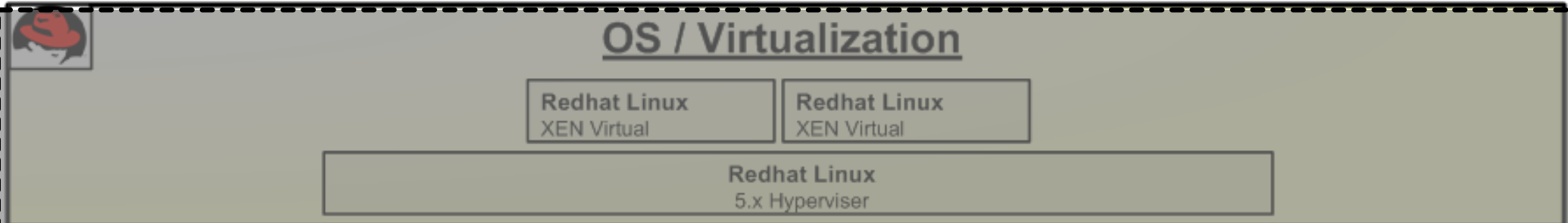
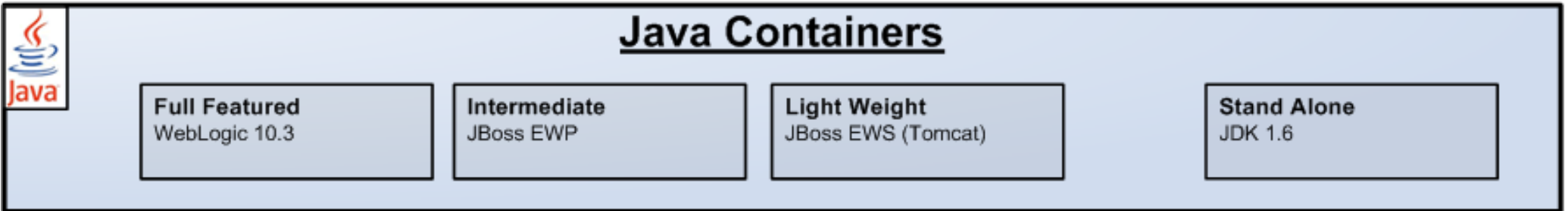
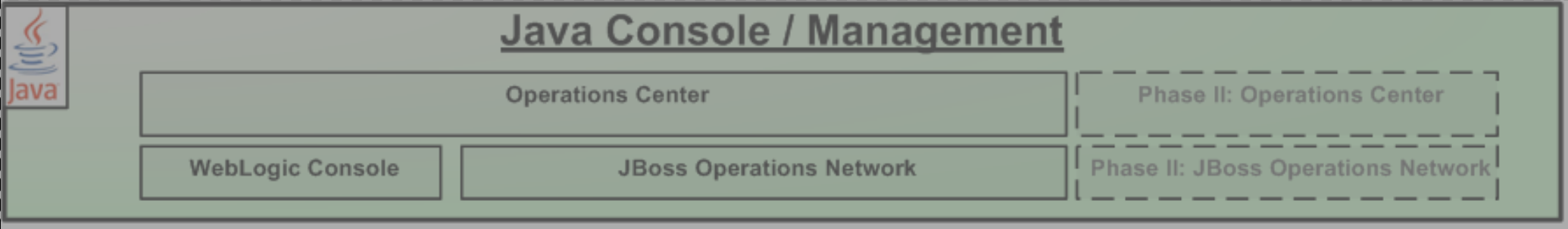
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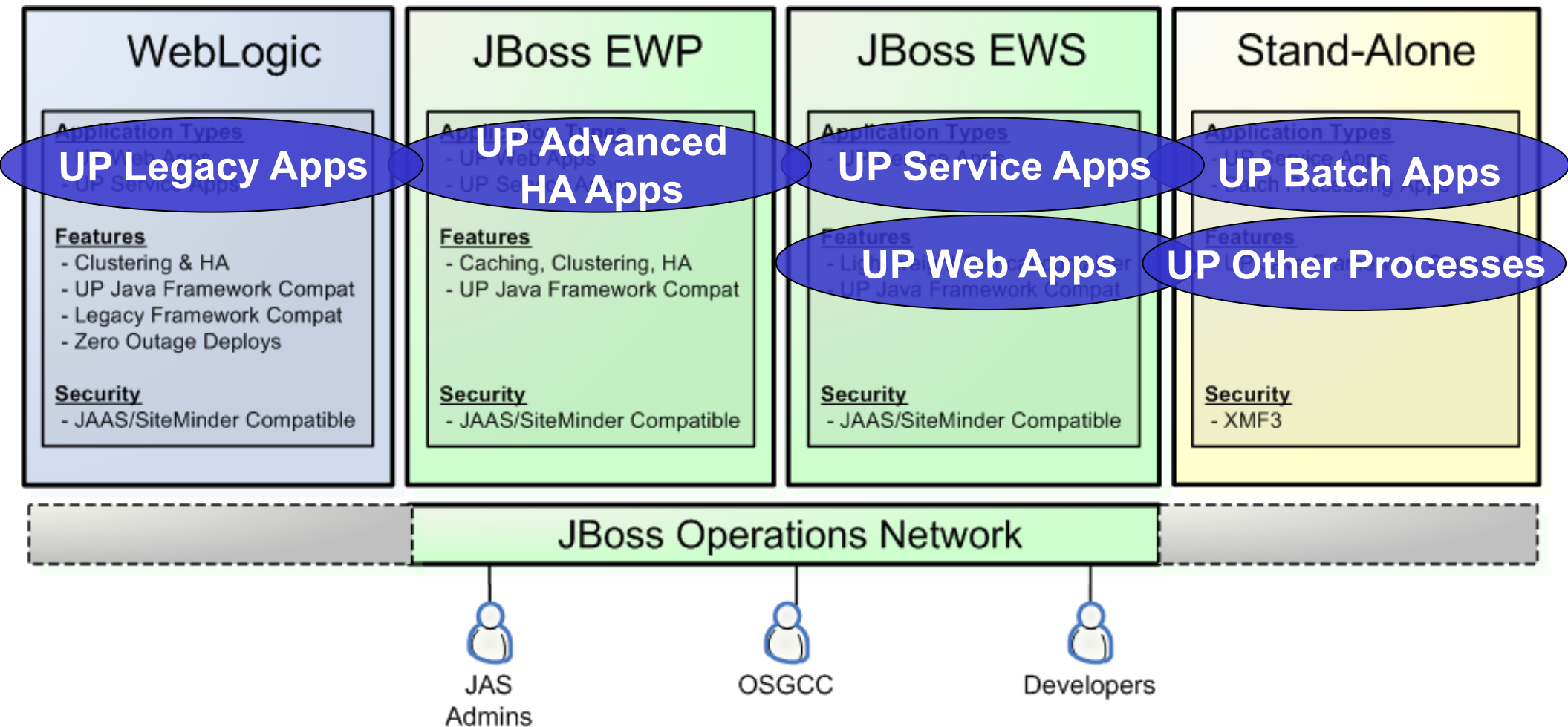
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# Java Hosting Environment

## Container Choices



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# The Linux Side

## Standard filesystem

RedHat binaries

```
/software/jboss/<product>/version  
/config/jboss/<product>/<version>/domains/<instance>  
/logs/jboss/<product>/<version>/domains/<instance> or apps  
/upapps/jbs/scripts
```

One ID owns binaries and scripts, second ID owns instances and logs

RHQ Agent under software and instance ID

In DEV developers use instance ID via “PMRUN”

RPM and the Satellite system

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# The “Split Brain”

## EWS

\$CATALINA\_HOME and \$CATALINA\_BASE both have standard Tomcat directory structure

/lib in \$CATALINA\_HOME forms system classpath

/conf and /webapps in \$CATALINA\_BASE for each instance

## EWP

run -c <full path to instance>

Single set of binaries, multiple instances

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```
#!/bin/bash

. ${JBS_SCRIPTSDIR}/env/jbs_setenv

CATALINA_BASE="${JBS_BASE}/${1}"

SERVER_NAME="${1}"

export CATALINA_BASE
SERVER_NAME JBS_LOGDIR

echo "Base is
${CATALINA_BASE}"

echo "Home is
${CATALINA_HOME}"

echo "Logging to
${JBS_LOGDIR}"

echo "Server
instance: ${SERVER_NAME}"

echo "Starting Jboss EWS...."

$CATALINA_HOME/bin/startup.sh
```

**ews\_start.sh JAS-A1**

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```
#!/bin/bash

. ${JBS_SCRIPTSDIR}/env/jbs_setenv
JBOSS_BASE="${JBS_CFGDIR}/${1}"
JBS_INSTANCE="${1}"
JBS_CLUSTER="${2}"
LAUNCH_JBOSS_IN_BACKGROUND="1"
SERVER_NUM="${3}"

case $JBS_CLUSTER in
    'WTG-A')
        PARTITION_NAME="wtgAPartition"
        MULTICAST_ADDR="239.192.9.0"
        MULTICAST_PORT=2000;;
    esac

case $SERVER_NUM in
    '1')
        BIND_SET="ports-default";;
    '2')
        BIND_SET="ports-01";;
    esac

export JBOSS_BASE JBS_INSTANCE JBS_LOGDIR LAUNCH_JBOSS_IN_BACKGROUND PARTITION_NAME MULTICAST_ADDR MULTICAST_PORT BIND_SET
echo "Base is ${JBOSS_BASE}"
echo "Home is ${JBOSS_HOME}"
echo "Logging to ${JBS_LOGDIR}"
echo "Server instance: ${JBS_INSTANCE} Cluster: ${JBS_CLUSTER} Server ${SERVER_NUM} on machine"
echo "Partition Name: ${PARTITION_NAME} Multicast Address: ${MULTICAST_ADDR} Multicast Port: ${MULTICAST_PORT} Bind Set: ${BIND_SET}"
echo "Starting Jboss EWP...."

$JBOSS_HOME/bin/run.sh -b 0.0.0.0 -Djgroups.bind_addr=$HOSTNAME -g $PARTITION_NAME -u $MULTICAST_ADDR -m $MULTICAST_PORT
-Djboss.server.base.dir=$JBS_CFGDIR -Djboss.server.base.url=file://${JBS_CFGDIR} -c $JBS_INSTANCE -Djboss.service.binding.set=$BIND_SET
```

**ewp\_start.sh WTG-A1 WTG-A 1**

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# Desktop Development

ITL images

Custom app servers that are pushed by request

“Clone” EWS/EWP and packages of Linux configurations

Eclipse Galileo with WTP

Use same \$CATALINA\_HOME/\$CATALINA\_BASE for EWS

Same -c runtime for EWP

Dynamic Web projects with Maven facets

Allows for step debugging of web apps, including JSP

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# Spring Framework support

Class Loadtime weaving (needed for AOP and JPA)

**EWS** – context.xml and Spring ApplicationContext.xml

Setenv.sh

```
-javaagent:$CATALINA_HOME/lib/spring-agent.jar
```

Context.xml

```
<Loader loaderClass="org.springframework.instrument.classloading.tomcat.TomcatInstrumentableClassLoader"  
  useSystemClassLoaderAsParent="false"/>
```

ApplicationContext.xml

```
<context:load-time-weaver/>
```

**EWP** – Spring ApplicationContext.xml and web.xml

ApplicationContext.xml

```
<context:load-time-weaver weaver-class="org.jboss.instrument.classloading.JBoss5LoadTimeWeaver"/>
```

Web.xml

```
<listener>  
  <listener-class>org.springframework.web.context.ContextLoaderListener</listener-class>  
</listener>
```

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# JBOSS Operations Network *Overview*

“Single pane of glass” for all Java processes

Web-based GUI for all JHE operations (start/stop/re-deploy)

Supplemental monitoring capability

Welcome to JBoss Operations Network

Please Login

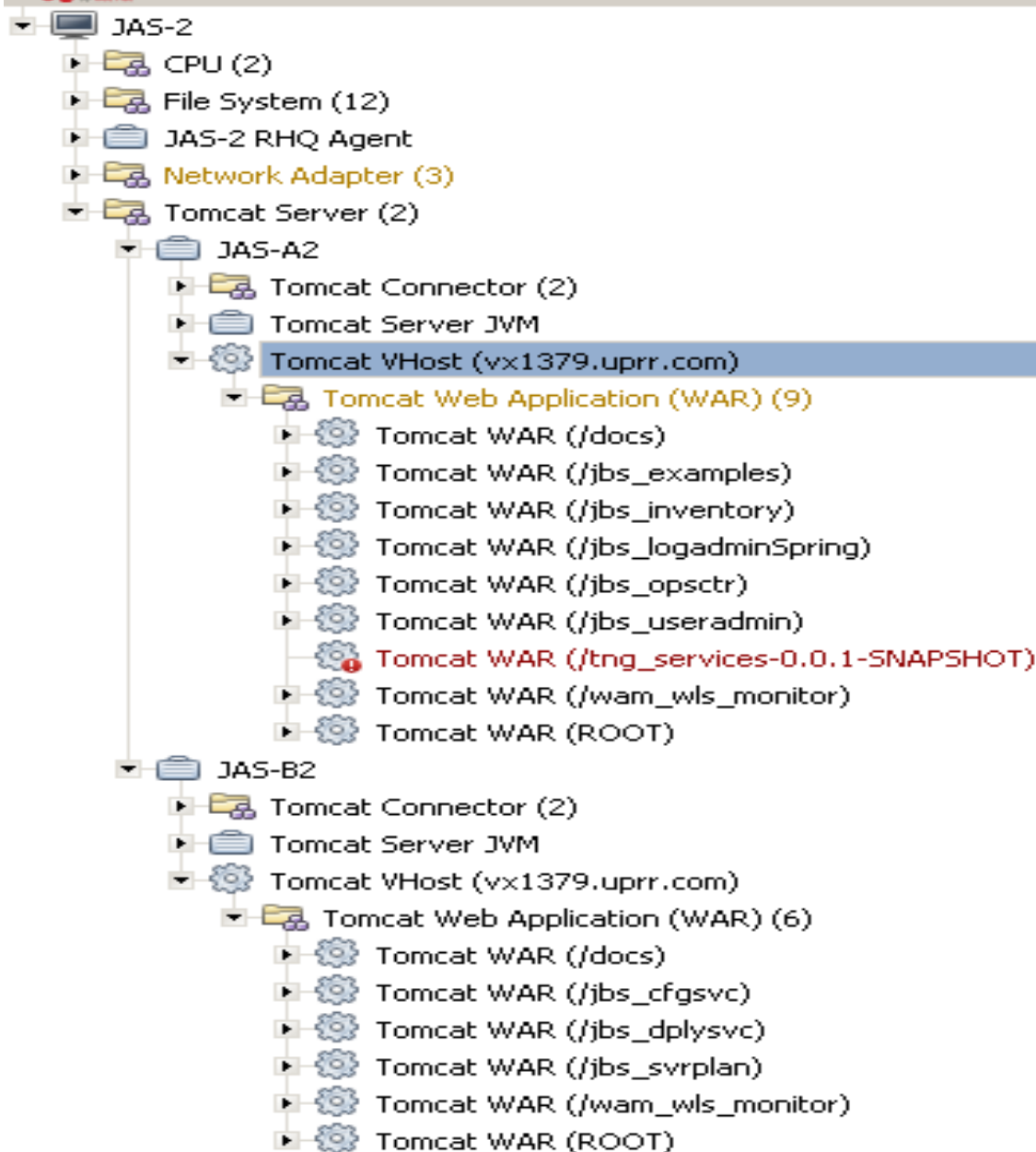
Login:	<input type="text"/>	Login
Password:	<input type="password"/>	

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vx1379.uprr.com
✓

[JAS-2](#) > [JAS-A2](#) > [Tomcat VHost \(vx1379.uprr.com\)](#)

**Summary**

**Type:** Tomcat Virtual Host (Service)  
**Version:** none

**Description:** A Tomcat virtual host  
**Parent:** Tomcat Server '[JAS-A2](#)'

SUMMARY
MONITOR
INVENTORY
ALERT
CONFIGURE

OVERVIEW
CONNECTION
AGENT

**General Properties**

**Name:** Tomcat VHost (vx1379.uprr.com)  
**Type:** Tomcat Virtual Host (Tomcat)  
**Version:** none  
**Description:** A Tomcat virtual host

**Date Created:** 2/22/10, 4:23:15 PM, CST  
**Date Last Modified:** 2/22/10, 4:23:15 PM, CST  
**Resource Key:** Catalina:host=vx1379.uprr.com,type=Host

[EDIT...](#)

**Child Resources**

<input type="checkbox"/>	Quick Links	Name	Category	Type	Plugin	Description	Availability
<input type="checkbox"/>		<a href="#">Tomcat WAR (/docs)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	✓
<input type="checkbox"/>		<a href="#">Tomcat WAR (jbs_examples)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	✓
<input type="checkbox"/>		<a href="#">Tomcat WAR (jbs_inventory)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	✓
<input type="checkbox"/>		<a href="#">Tomcat WAR (jbs_logadminSpring)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	✓
<input type="checkbox"/>		<a href="#">Tomcat WAR (jbs_opscctr)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	✓
<input type="checkbox"/>		<a href="#">Tomcat WAR (jbs_useradmin)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	✓
<input type="checkbox"/>		<a href="#">Tomcat WAR (tng_services-0.0.1-SNAPSHOT)</a>	Service	Tomcat Web Application (WAR)	Tomcat	Tomcat Web Application	!
<input type="checkbox"/>		<a href="#">Tomcat WAR</a>	Service	Tomcat Web Application	Tomcat	Tomcat	✓

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[Browse Resources](#) > [Compatible Groups](#)Search:  [Platforms \( 26 \)](#) | [Servers \( 138 \)](#) | [Services \( 1845 \)](#) | [Compatible Groups \( 22 \)](#) | [Mixed Groups \( 3 \)](#) | [Group Definitions \( 1 \)](#)View:  

<input type="checkbox"/>	Group ▲ 1	Group Type	Plugin	Description
<input type="checkbox"/>	AUT	Linux	Platforms	
<input type="checkbox"/>	CP_JB	Linux	Platforms	
<input type="checkbox"/>	FNPO	Linux	Platforms	
<input type="checkbox"/>	FTM	Linux	Platforms	
<input type="checkbox"/>	HR_OHM	Linux	Platforms	
<input type="checkbox"/>	IDA	Linux	Platforms	
<input type="checkbox"/>	JAS	Linux	Platforms	
<input type="checkbox"/>	JESS	Linux	Platforms	
<input type="checkbox"/>	MSTR	Linux	Platforms	Collection of Master files resources
<input type="checkbox"/>	NC_ARCH	Linux	Platforms	
<input type="checkbox"/>	NMS	Linux	Platforms	
<input type="checkbox"/>	OSG_CPU	CPU	Platforms	
<input type="checkbox"/>	OSG_FILESYSTEM	File System	Platforms	
<input type="checkbox"/>	OSG_TOMCAT_JVM	Tomcat Server JVM	Tomcat	
<input type="checkbox"/>	OSG_TOMCAT_SERVER	Tomcat Server	Tomcat	

DELETE

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# Winning the political battle

## Lay the groundwork

- Establish container-agnostic development standards

- “Upgrade” the existing container

- Allow only apps meeting modern standards in new version

- Shut down old container

## Keep familiarity

- Same processes

- Same domain/cluster hosting model

- Same development tools

## Stand-Alone versus container execution of Spring services

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