

The logo features the word "SUMMIT" in a large, white, sans-serif font. It is positioned on a red rectangular background that has a diagonal cutout on the right side, creating a wedge shape. The red background is set against a dark gray background.

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# Enterprise Java Hosting in a Cloud Environment

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Web Infrastructure  
Union Pacific Railroad  
24 June 2010

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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

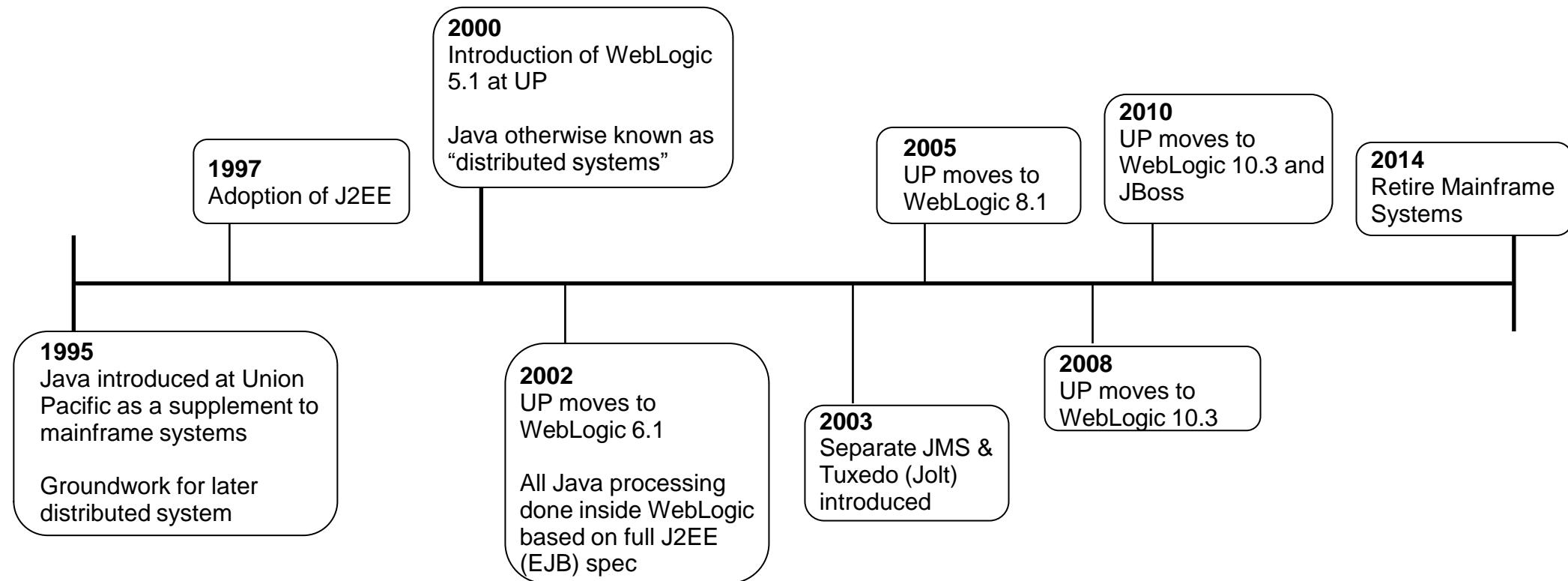
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# History of Java at Union Pacific



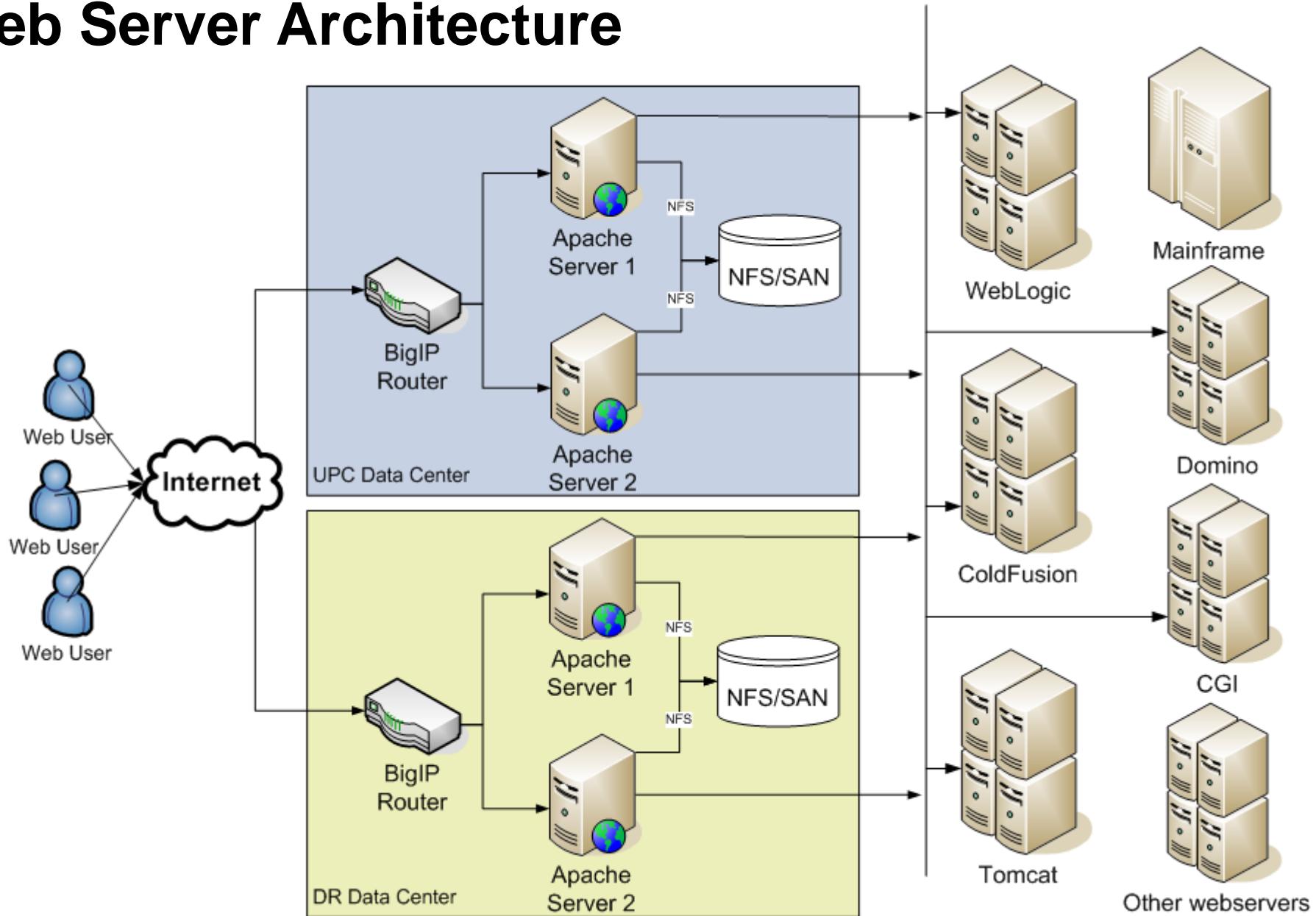
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# Web Server Architecture



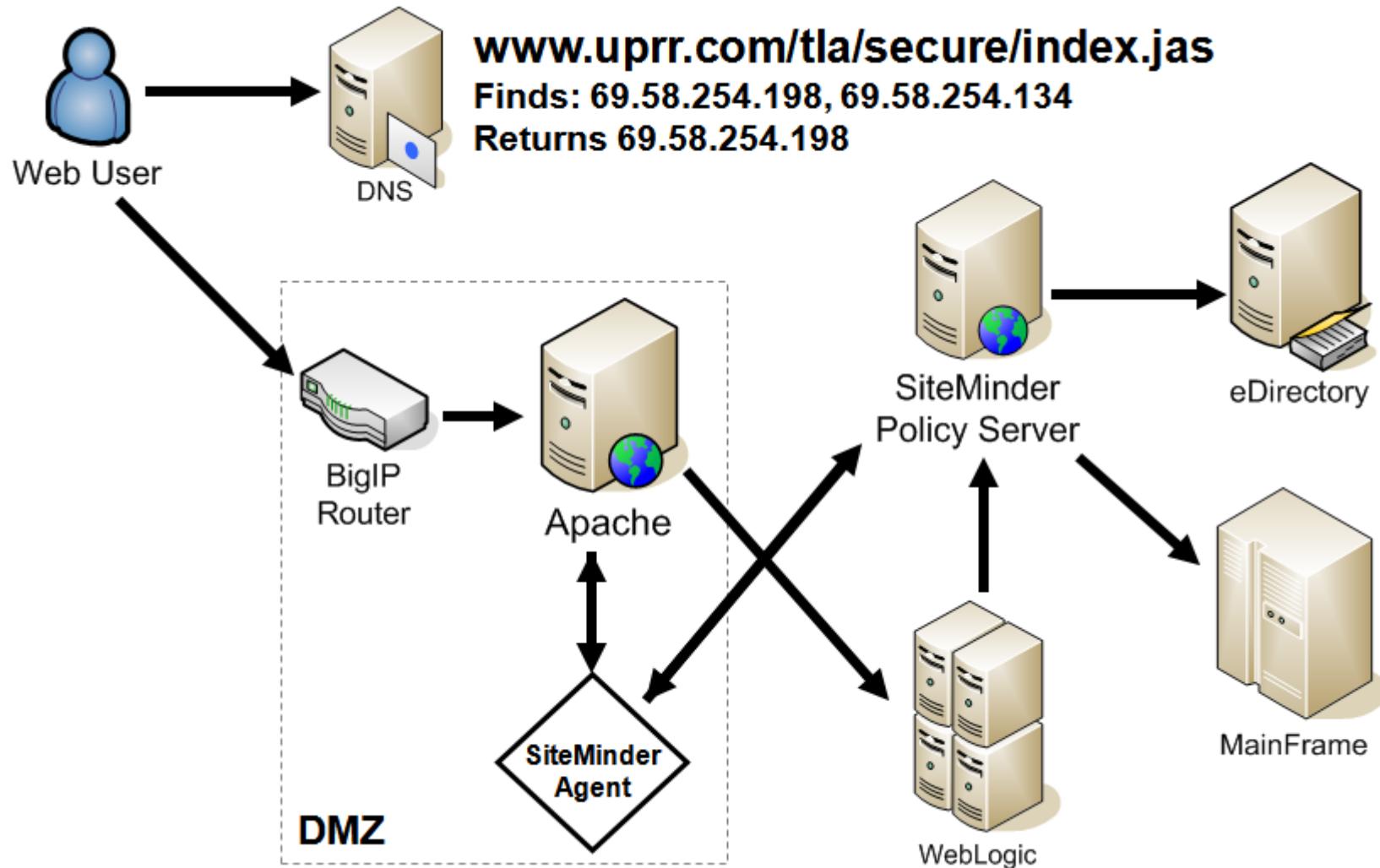
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# Web Request Trace - SiteMinder



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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

The Oracle logo, which consists of a blue cylinder with the word 'ORACLE' in red.

ESB

Monitoring  
Feeds



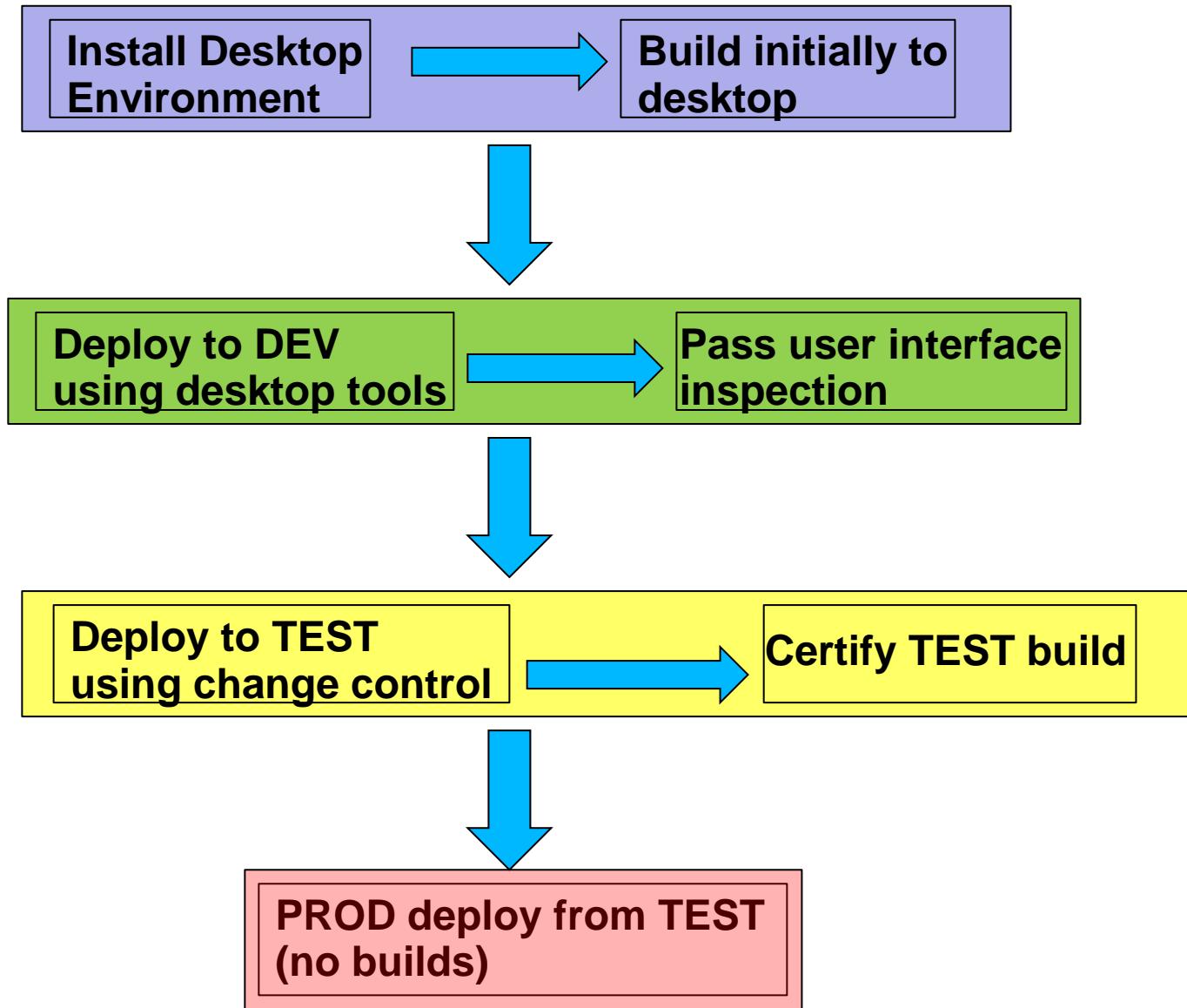
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# From Development to Production



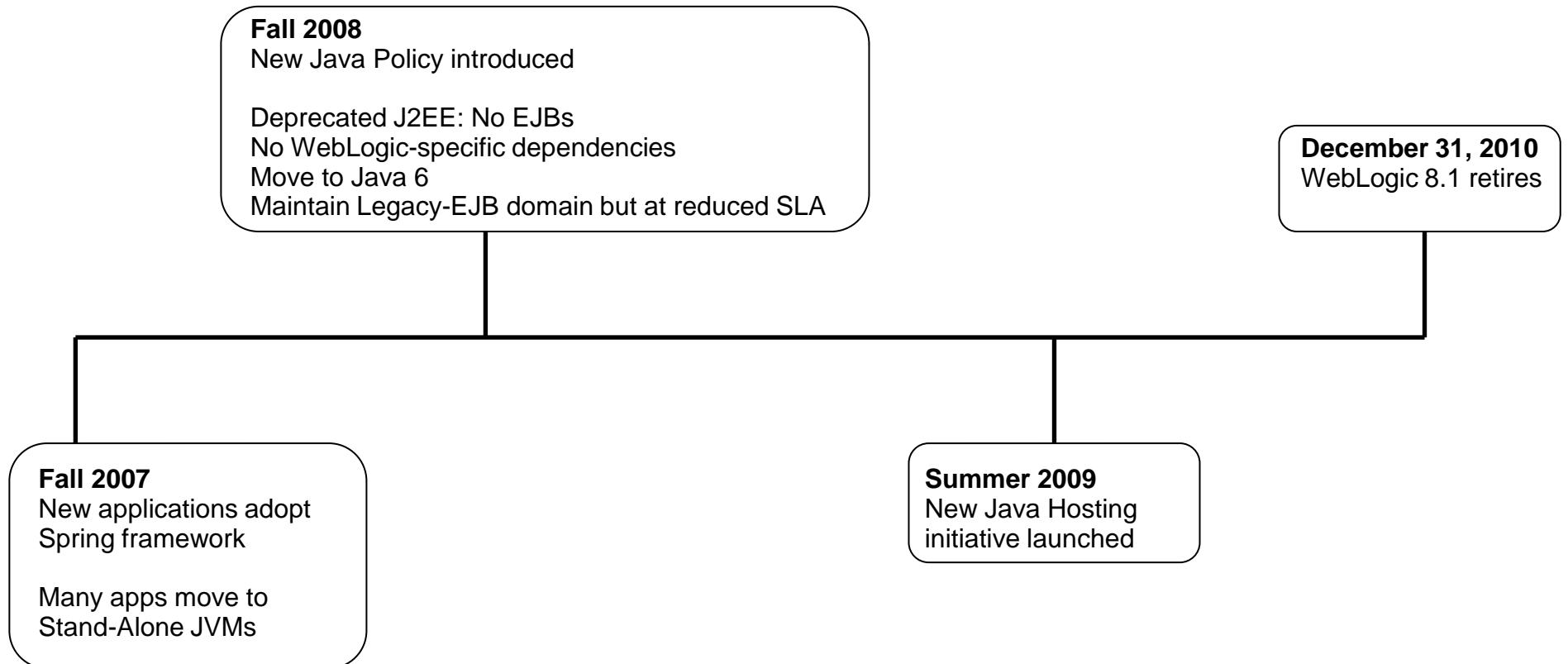
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# WebLogic and the move to 10.3 (Spring)



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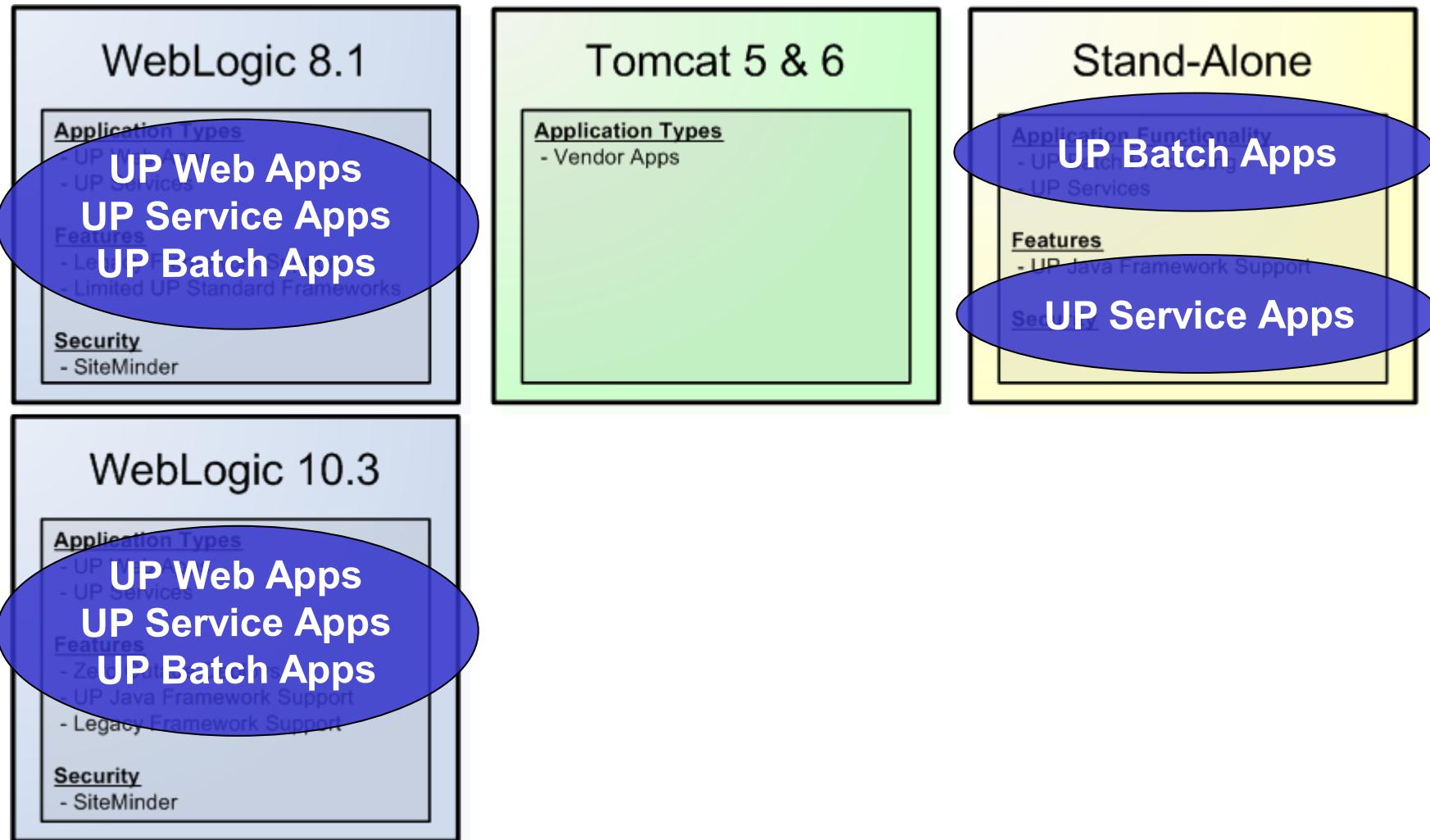
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# Current Environment

## 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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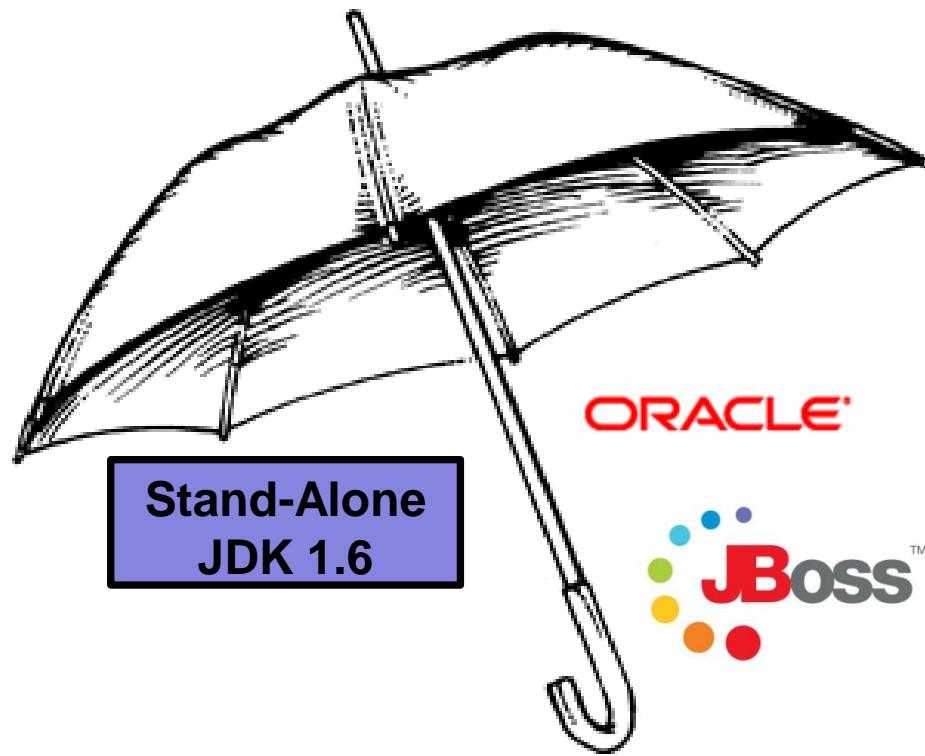
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# Java Hosting Environment (JHE)

## 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

### Java Console / Management

Operations Center

WebLogic Console

JBoss Operations Network

Phase II: Operations Center

Phase II: JBoss Operations Network

### Java Containers

Full Featured  
WebLogic 10.3

Intermediate  
JBoss EWP

Light Weight  
JBoss EWS (Tomcat)

Stand Alone  
JDK 1.6

### OS / Virtualization

Redhat Linux  
XEN Virtual

Redhat Linux  
XEN Virtual

Redhat Linux  
5.x Hypervisor

### Hardware

Dell 905  
16-core 2.3Ghz 128Gb

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# Java Hosting Environment

## *Private Cloud*

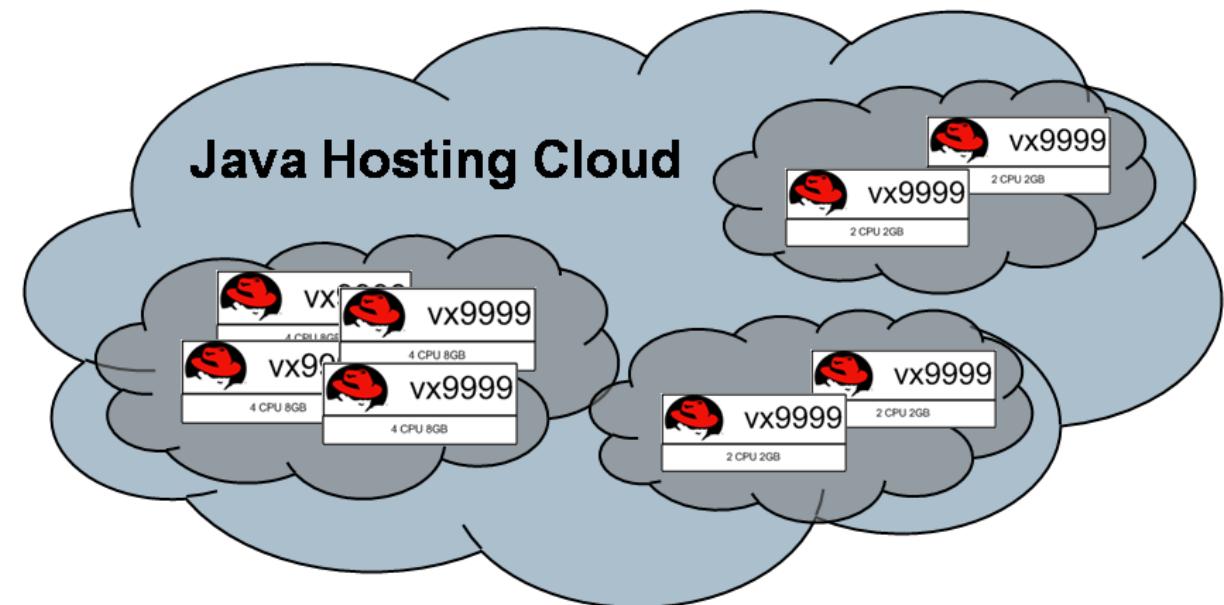
Infrastructure as a Service

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:

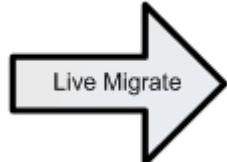
Administration

Capacity

Increased availability via:

Isolation

Clustering



**Live Migrate**  
8 Second OS Pause  
No Process Restarts



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# Java Hosting Environment

## Technology Stack



### Java Console / Management

Operations Center

WebLogic Console

JBoss Operations Network

Phase II: Operations Center

Phase II: JBoss Operations Network



### Java Containers

**Full Featured**  
WebLogic 10.3

**Intermediate**  
JBoss EWP

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Redhat Linux  
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5.x Hypervisor



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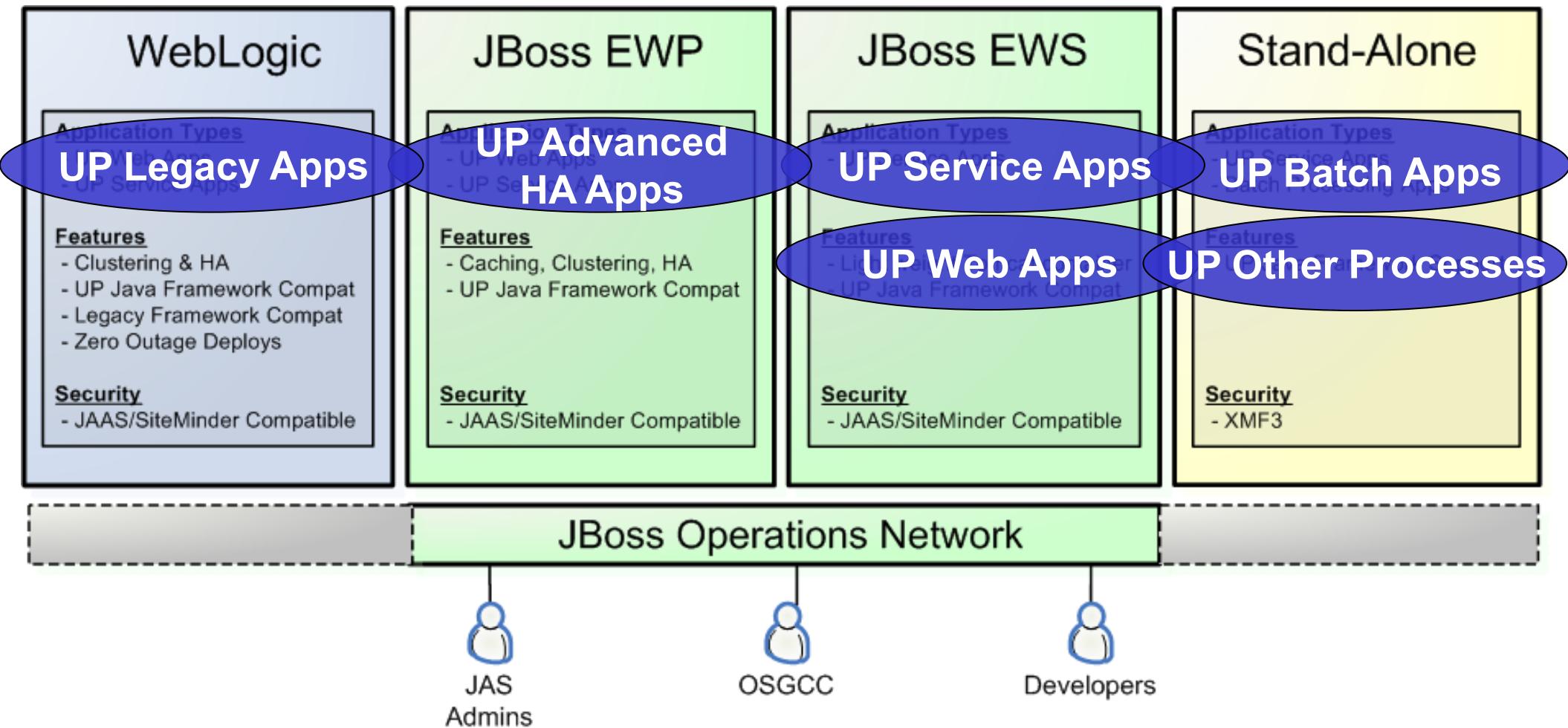
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# Java Hosting Environment

## 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



```
#!/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"/>     | <input type="button" value="Login"/> |
| Password: | <input type="password"/> |                                      |

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[Overview](#)[Resources](#)[Groups](#)[Administration](#)

- └ JAS-2
  - └ CPU (2)
  - └ File System (12)
  - └ JAS-2 RHQ Agent
  - └ Network Adapter (3)
  - └ Tomcat Server (2)
    - └ JAS-A2
      - └ Tomcat Connector (2)
      - └ Tomcat Server JVM
      - └ Tomcat VHost (vx1379.uprr.com)
        - └ Tomcat Web Application (WAR) (9)
          - └ Tomcat WAR (/docs)
          - └ Tomcat WAR (/jbs\_examples)
          - └ Tomcat WAR (/jbs\_inventory)
          - └ Tomcat WAR (/jbs\_logadminSpring)
          - └ Tomcat WAR (/jbs\_opsctr)
          - └ Tomcat WAR (/jbs\_useradmin)
          - └ Tomcat WAR (/tng\_services-0.0.1-SNAPSHOT)
          - └ Tomcat WAR (/wam\_wls\_monitor)
          - └ Tomcat WAR (ROOT)
      - └ JAS-B2
        - └ Tomcat Connector (2)
        - └ Tomcat Server JVM
        - └ Tomcat VHost (vx1379.uprr.com)
          - └ Tomcat Web Application (WAR) (6)
            - └ Tomcat WAR (/docs)
            - └ Tomcat WAR (/jbs\_cfgsvc)
            - └ Tomcat WAR (/jbs\_dplysvc)
            - └ Tomcat WAR (/jbs\_svrplan)
            - └ Tomcat WAR (/wam\_wls\_monitor)
            - └ Tomcat WAR (ROOT)

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**Tomcat VHost (vx1379.uprr.com)**  
**JAS-2 > JAS-A2 > Tomcat VHost (vx1379.uprr.com)**

**Summary**

**Type:** Tomcat Virtual Host (Service)      **Description:** A Tomcat virtual host  
**Version:** none      **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"/> |             | <b>Tomcat WAR (/docs)</b>                        | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR (/jbs_examples)</b>                | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR (/jbs_inventory)</b>               | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR (/jbs_logadminSpring)</b>          | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR (/jbs_opscstr)</b>                 | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR (/jbs_useradmin)</b>               | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR (/tng_services-0.0.1-SNAPSHOT)</b> | Service  | Tomcat Web Application (WAR) | Tomcat | Tomcat Web Application |              |
| <input type="checkbox"/> |             | <b>Tomcat WAR</b>                                | 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: All Group Types

All Plugin Types

| <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    |                                      |

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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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