

# Oracle WebLogic for Administrators

**The Full Course**

**Instructor:** Chris Parent

# Course Overview

**BackupHA**  
**Machines Security Realm**  
**Managed Server Clusters**  
**Node Manager Security Providers**  
**Remote Deployment Deploy Applications**  
**JMS Startup Shutdown**  
**Create domain SSL RBAC**  
**Logging Migration**  
**Install JDBC**

# Who Should Take this Course?

- Administrators
- Developers too

# Prerequisites

View my free Udemy course:

***Beginning Oracle WebLogic for Administrators***

# What You Need for this Course

- Capable computer
- Java Development Kit
- WebLogic 12c installer

# Installing WebLogic

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# Installation Methods

- Interactive using Oracle Universal Installer
- Silent using Response files

# Lab Exercise

- Refer to course material for

## **Lab Exercise #1: Installing WebLogic**



# Creating a Domain

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# Tools for Creating Domains

- Configuration Wizard
- Domain Template Builder
- WebLogic Scripting Tool (WLST)

# Domain Structure

■ config/

■ servers/

■ bin/

■ security/

config.xml  
jdbc/

Start and stop scripts  
Admin-managed Node Manager

Hash file  
Demo certificates  
LDAP initialization

# Lab Exercise

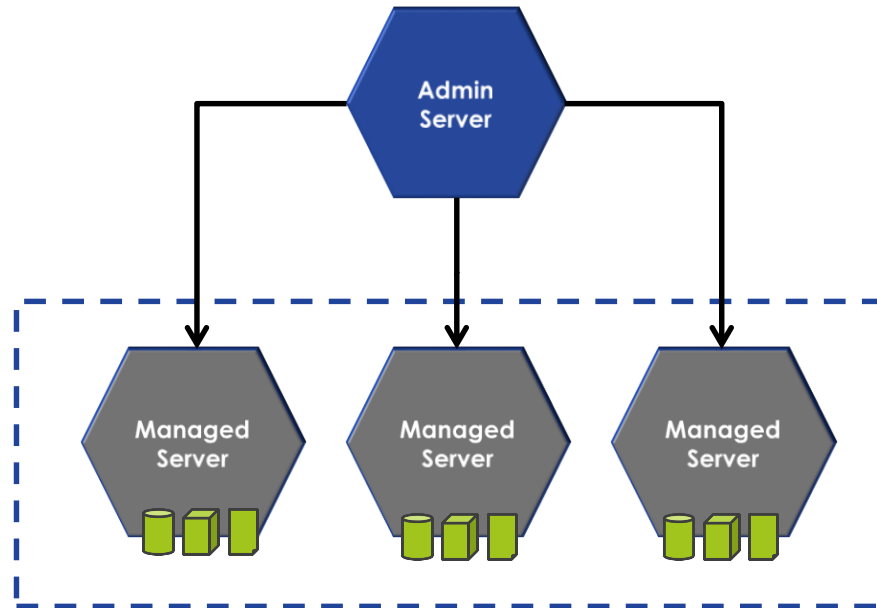
- Refer to course material for

## Lab Exercise #2: Creating a WebLogic Domain

# Admin Server

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# What is the Admin Server?



# Tools and APIs

## ▣ Interfaces:

- ▣ Admin Console
- ▣ Fusion Middleware Control
- ▣ Enterprise Manager Cloud Control
- ▣ WebLogic Scripting Tool (WLST)
- ▣ Ant tasks

## ▣ APIs:

- ▣ JMX
- ▣ Java EE Management API
- ▣ Deployment API
- ▣ Logging API

# Starting up the Admin Server

■ \$DOMAIN\_HOME/bin/startWebLogic.sh (.bat)



# Admin Console Overview

- Configure and manage server lifecycle
- Configure Clusters
- Configure WebLogic services
- Configure security
- Deploy applications
- Monitor server and app performance
- View logs
- Manage deployment descriptors
- Configure Coherence Clusters

# Lab Exercise

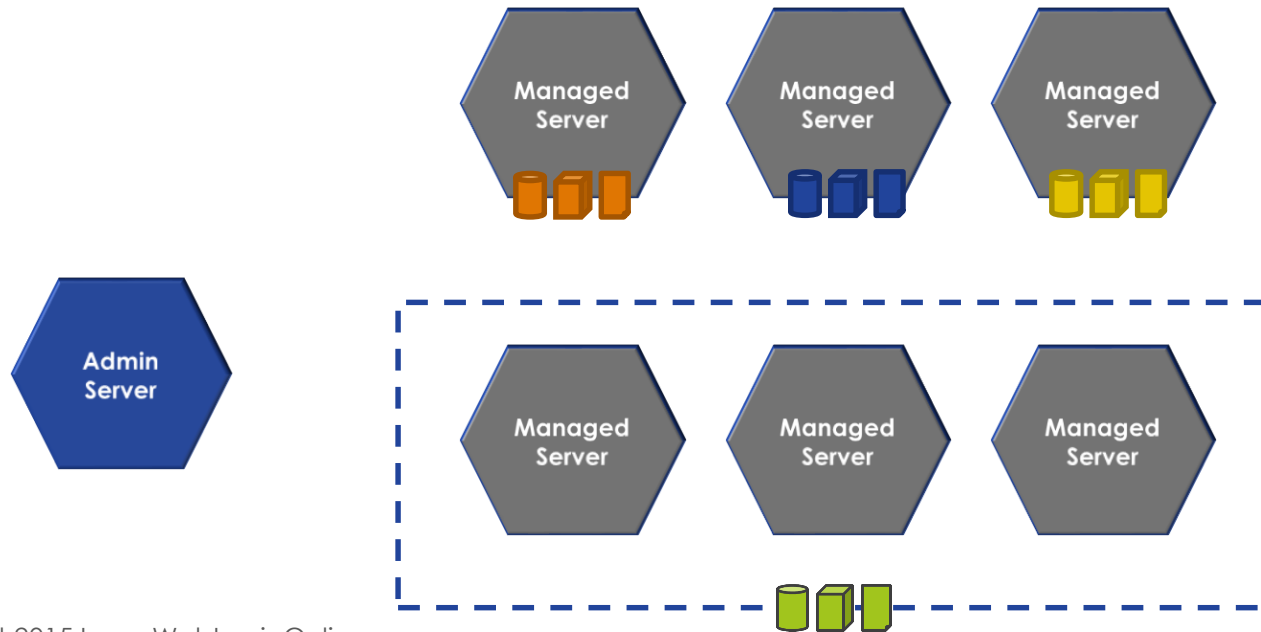
- Refer to course material for

## **Lab Exercise #3: Admin Console**

# Managed Servers

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# What is a Managed Server?



# Configure a Managed Server

- Logical name
- Listen address
- Listen port

# Lab Exercise

- ▣ Refer to course material for

## **Lab Exercise #4: Creating a Managed Server**

# Data Sources

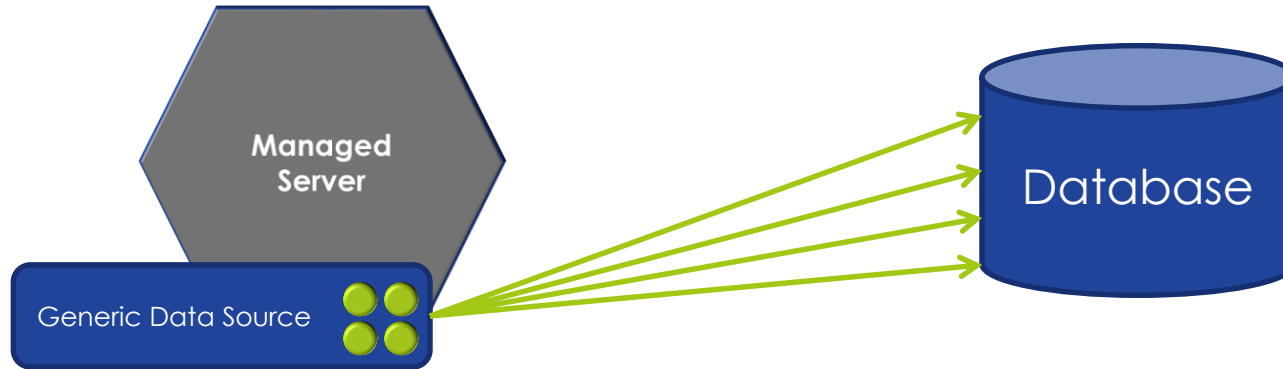
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# Data Sources

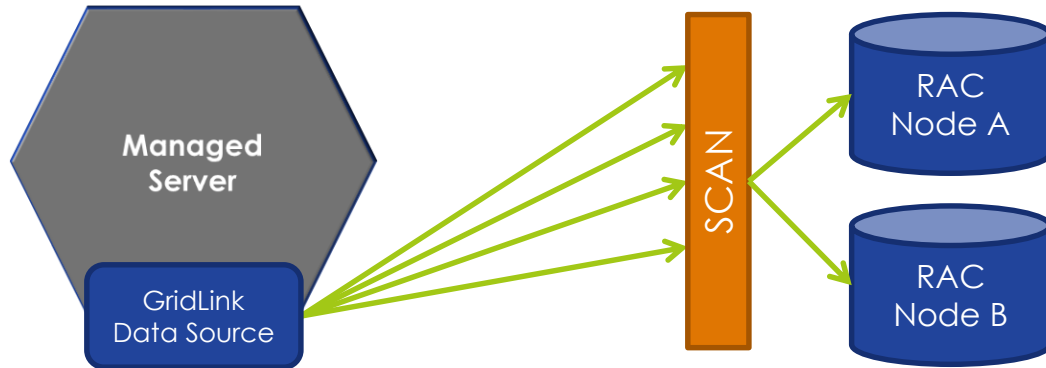
- Generic
- GridLink
- Multi data sources
- Java EE



# Generic Data Sources

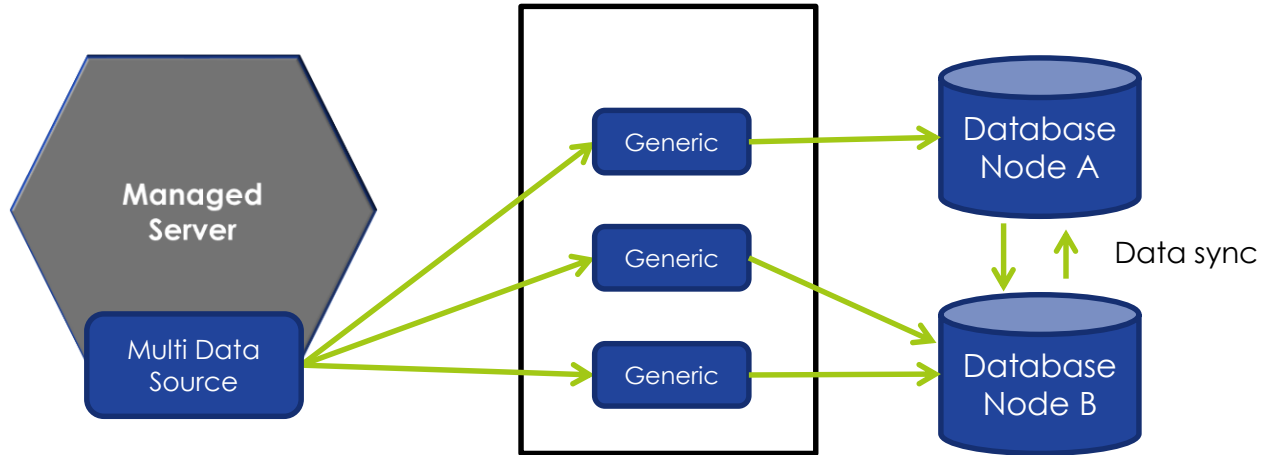


# GridLink Data Source



- Fast connection failover (FCF)
- Runtime Connection Load Balancing
- GridLink Affinity
- Secure communication
- SCAN

# Multi Data Source



# Configuring Data Sources

- Console or WLST
- Created as JDBC system module
- `DOMAIN_HOME/config/jdbc/*.xml`

# Supported Databases

- Oracle Thin Driver (XA, Non-XA)
- MySQL (non-XA)
- Third-party JDBC drivers
- DataDirect drivers for DB2, Informix, MSSQL, and Sybase

# Transactions Options

- XA – 2PC – global transactions
- Non-XA – local transactions
  - Global Transactions (default)
  - Transaction Protocols:
    - Logging Last Resource
    - Emulate Two-Phase Commit
    - One-Phase Commit (Default)

# Lab Exercise

- Refer to course material for

## **Lab Exercise #5: Creating a Generic Data Source**

# Java Message Service

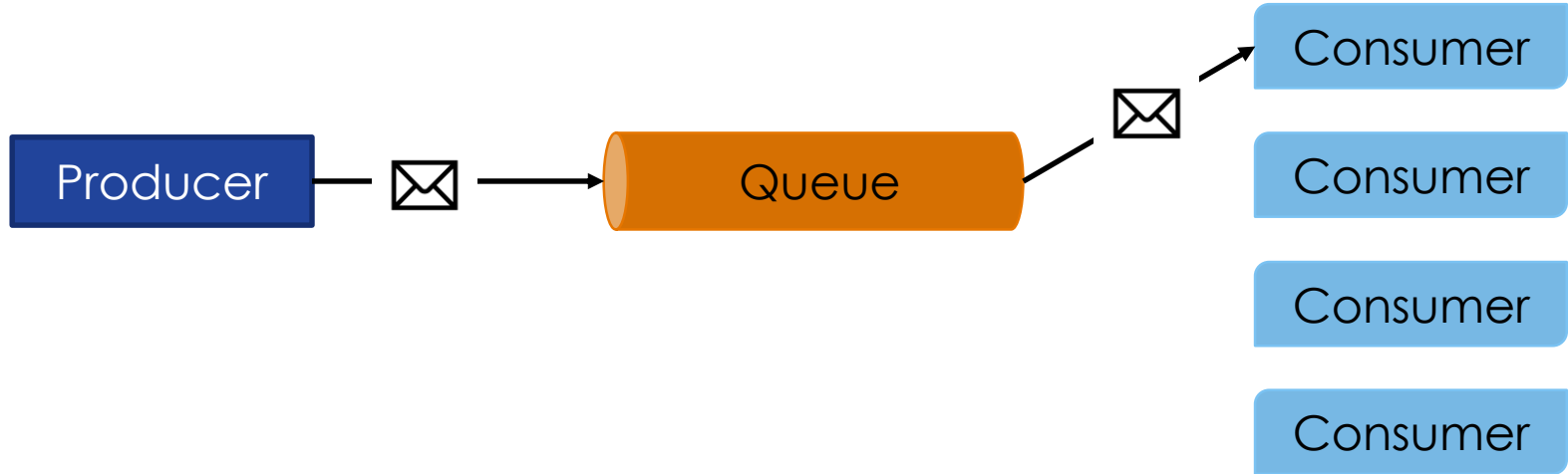
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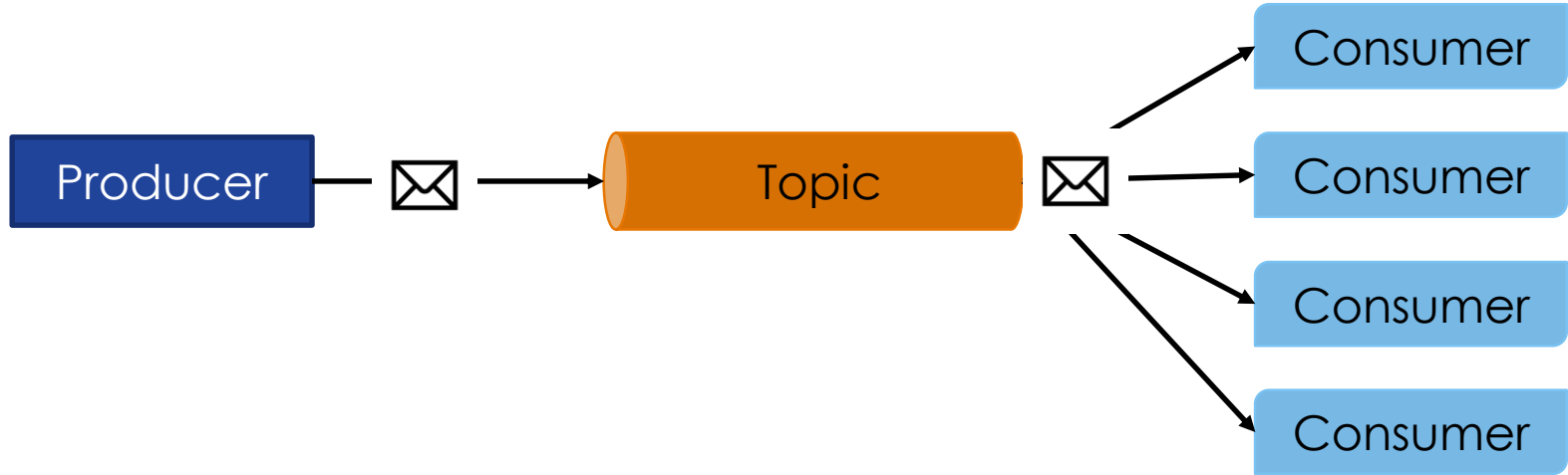
# What is JMS?

- Java EE Standard
- Enables async communication between applications
- Messages can be binary, text, XML

# Point to Point Messaging



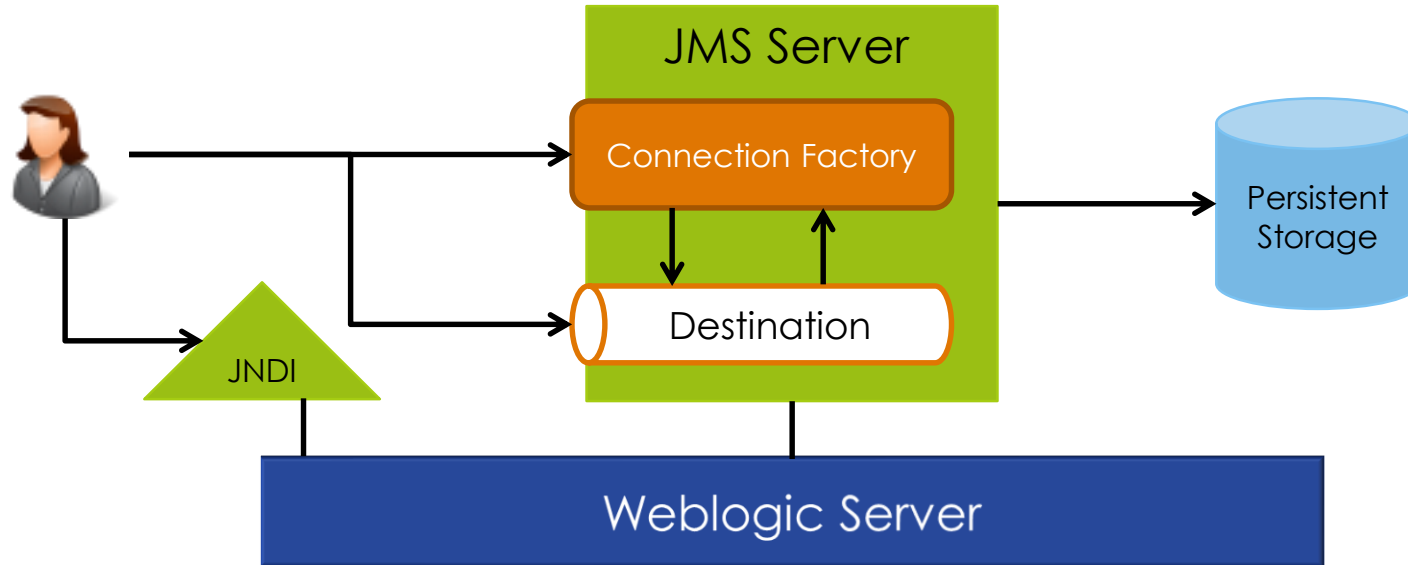
# Publish / Subscribe Messaging



# WebLogic JMS Architecture

- JMS server
- JMS connection host and factories
- JMS destinations
- JMS modules
- JNDI
- Persistent Storage

# WebLogic JMS Architecture



# JMS Configuration

- config.xml
  - JMS Server
- Module descriptor files
  - JMS Configuration Resources (Destinations, Conn Factories)

# JMS Modules

- Application-related definitions for JMS resources
- System modules
  - config\jms subdirectory
  - Owned by administrator
- Application modules
  - Owned by developers

# JMS Resources in Modules

- Queue and topic destinations
- Connection factories
- Templates
- Quotas
- Distributed destinations
- Foreign servers



# Configuring WebLogic JMS

1. Persistent storage
2. JMS server
3. JMS system module
4. JMS destination

# Naming Requirements

- All resources must have a unique name
  - Includes servers, machines, clusters, virtual hosts, all system resources
- Any name must be different than domain name

# Configuring JMS Server

- Done through Admin Console or WLST
- Define configuration parameters: persistent storage, paging defaults, templates
- Messaging logging
- Target: WebLogic server or Migratable target

# Configuring JMS System Module

- Done through Admin Console or WLST
- Target: WebLogic server instance or cluster

# Lab Exercise

- Refer to course material for

## **Lab Exercise #6: JMS Resources**

# Application Deployment

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# What can be Deployed?

- Enterprise application
- Web application
- EJB
- Resource Adapter
- Web service
- Java EE Library
- JDBC, JMS, WLDF modules

# What is Deployment?

- Package application or module
- Copy to server(s) or cluster
- Managing lifecycle



# Packaging Apps for Deployment

- Archive files
- Exploded archive directories

# Deployment Tools

- weblogic.Deployer
- Admin Console
- WLST

# weblogic.Deployer

## ■ Command-line interface

```
java weblogic.Deployer -adminurl http://localhost:7001 -username  
weblogic -password weblogic -deploy c:\localfiles\myapp.ear
```

# Admin Console

- Wizard-driven
- Manage and monitor deployment status

# WLST

## ■ WLST syntax

```
deploy("examplesWebApp","C:/Oracle/Middleware/wlserver/samples/server/  
examples/build/examplesWebApp")
```

# Deployment Modes

## stage

- Files copied to target servers
- Used for small to medium sized applications

## nostage

- Files not copied to target servers
- Requires same physical copy
- Used for larger applications

## external\_stage

- Files not copied
- Managed by external process

# Lab Exercise

- Refer to course material for

## **Lab Exercise #7: Application Deployment**

# Production Deployment

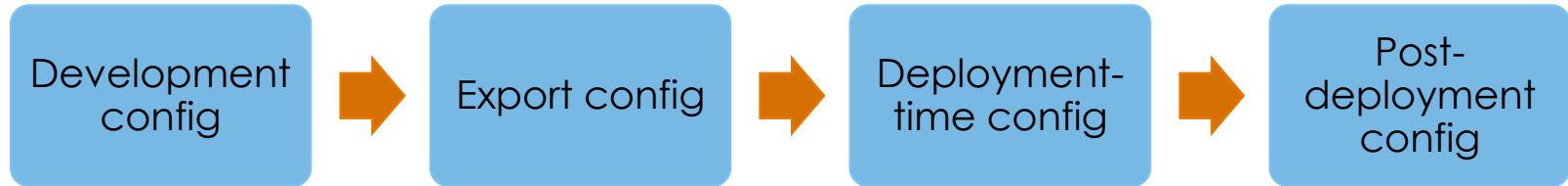
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# What is Production Deployment?

- Deployment follows well-defined process (DCLC)
- Integrated with SDLC and release management
- Supported with Deployment Plans, Names and Version Strings

# Deployment Life Cycle



# Deployment Names

- Deployment Names
  - Default name is archive file without extension
    - myApp.ear = myApp
  - Can be specified at deployment time
  - Deployment descriptor
    - <application-name>
    - <module-name>

# Deployment Versions

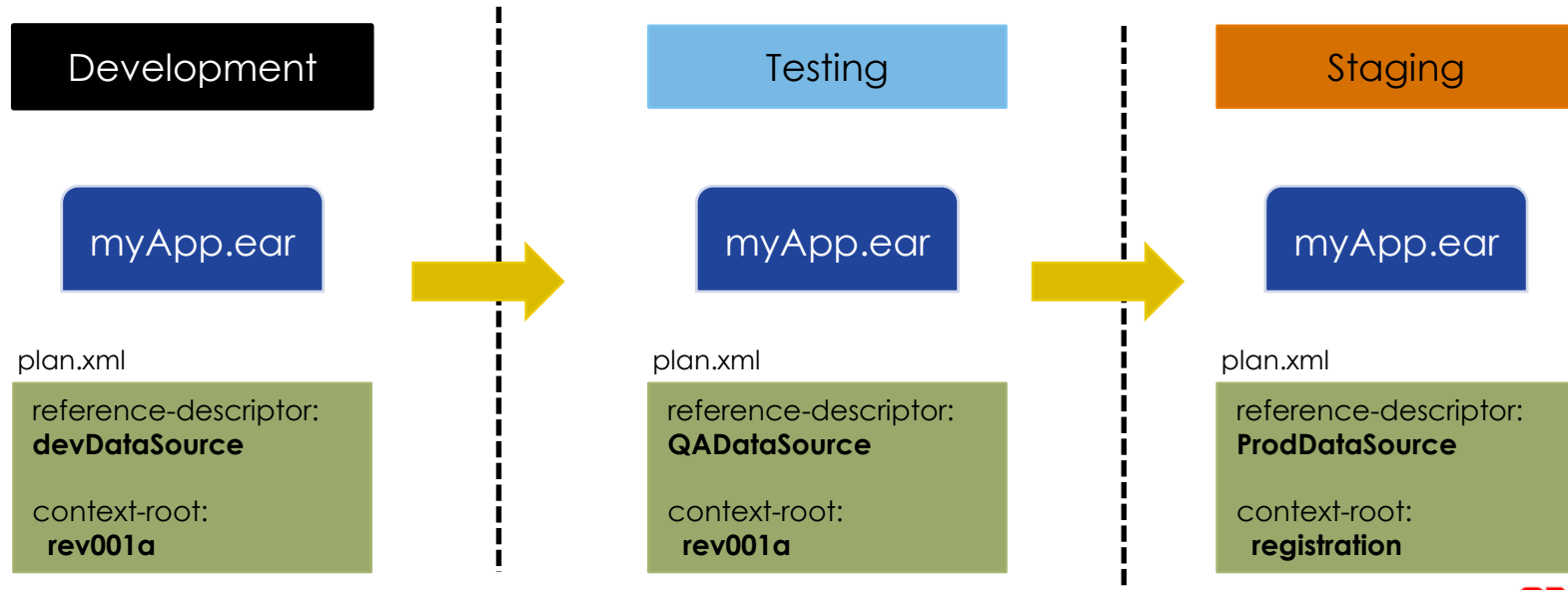
- Identify initial and subsequent deployments
- Allows zero-down upgrades
- Specified in MANIFEST.MF

```
Manifest-Version: 1.0  
Created-By: 1.4.1_05-b01 (Sun Microsystems Inc.)  
Weblogic-Application-Version: v920.beta
```

# Deployment Plans

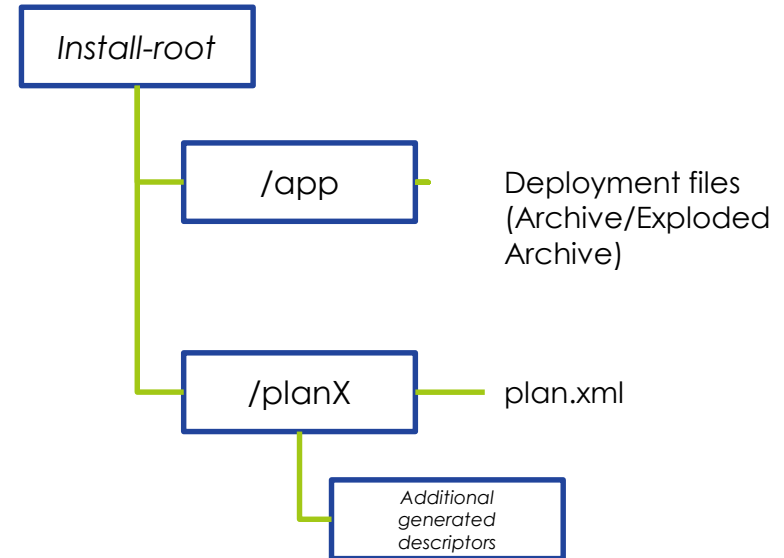
- Environment-specific configuration
- Overrides or substitutes DD property values
- Optional XML document
- Created by developers

# Workflow Example



# Application Installation Directory

- Separates config files from application files
- Manage with source control
- **Oracle Best Practice**



# Auto-Deploying Applications

- Automatically deploy and update applications under /autodeploy
- Only supported in **DEVELOPMENT** mode
- Limited:
  - Only deployed to Admin Server
  - No entry in config.xml
  - Security policies not supported



# Production Redeployment

- Zero down-time upgrade
- New version alongside old version
- Client connections managed by WebLogic
- Eliminates need for redundant servers
- Supports administration mode

# In-place Redeployment

- Old version immediately replaced with new version
- Zero-Interruption not guaranteed
- Default redeployment method
- Required for apps that do not specify version

# Lab Exercise

- Refer to course material for

## **Lab Exercise #9: Production Deployment**

# Managing Applications

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# Managing Applications

- Admin Console
- WLST
- JMX

# Going Offline

- Restrict client access
  - Place application into **ADMIN MODE**
- Undeploy application

# Deployment Order

## ■ Default Order

1. JDBC system modules
2. JMS system modules
3. Java EE libraries and packages
4. Application and standalone modules
5. Startup classes

# Changing Deployment Order

- Applications and modules
- Admin Console or Programmatically
  - **AppDeploymentMBean DeploymentOrder** attribute
- Default Order value of 100
- Deployed alphabetically with same Order Value



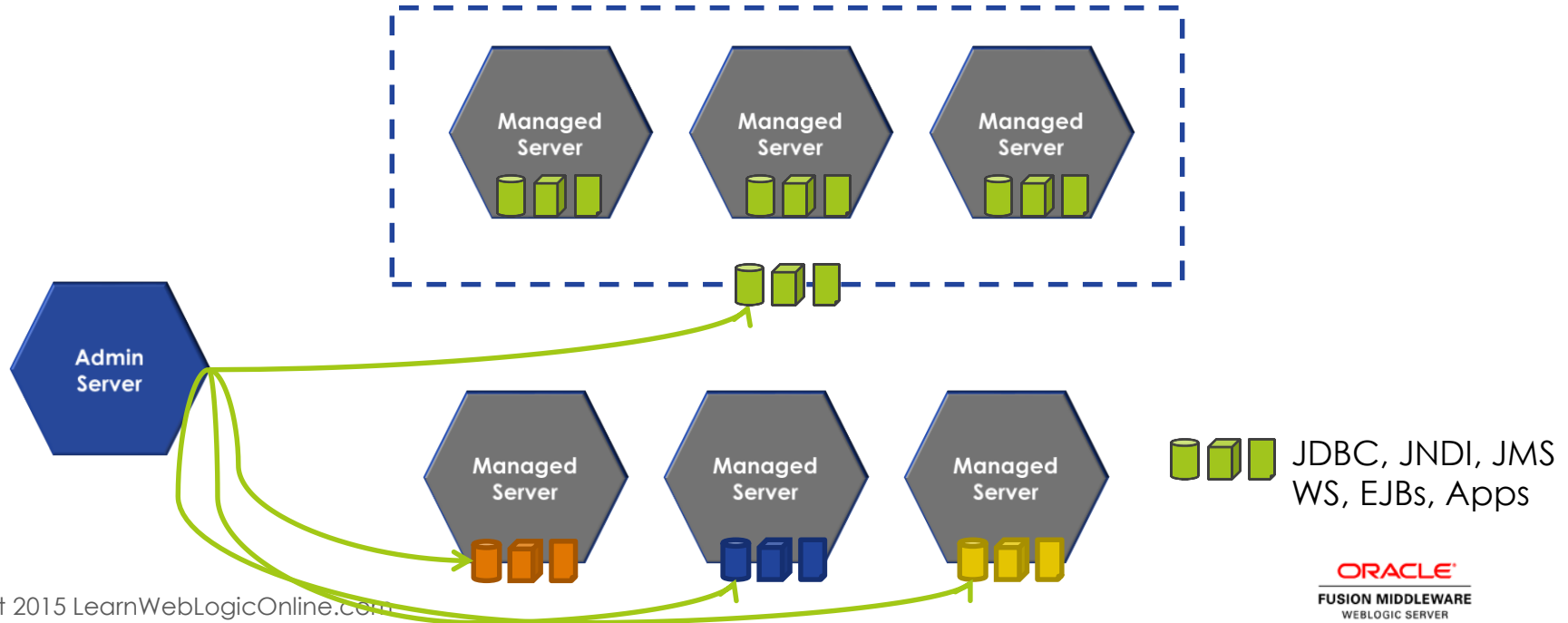
# Lab Exercise

- Refer to course material for **Lab Exercise #8: Managing Applications**

# WebLogic Clusters

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# What is a Cluster



# Benefits and Capabilities

- Scalability
- High Availability
- Application Failover
- Server Migration
- Load Balancing

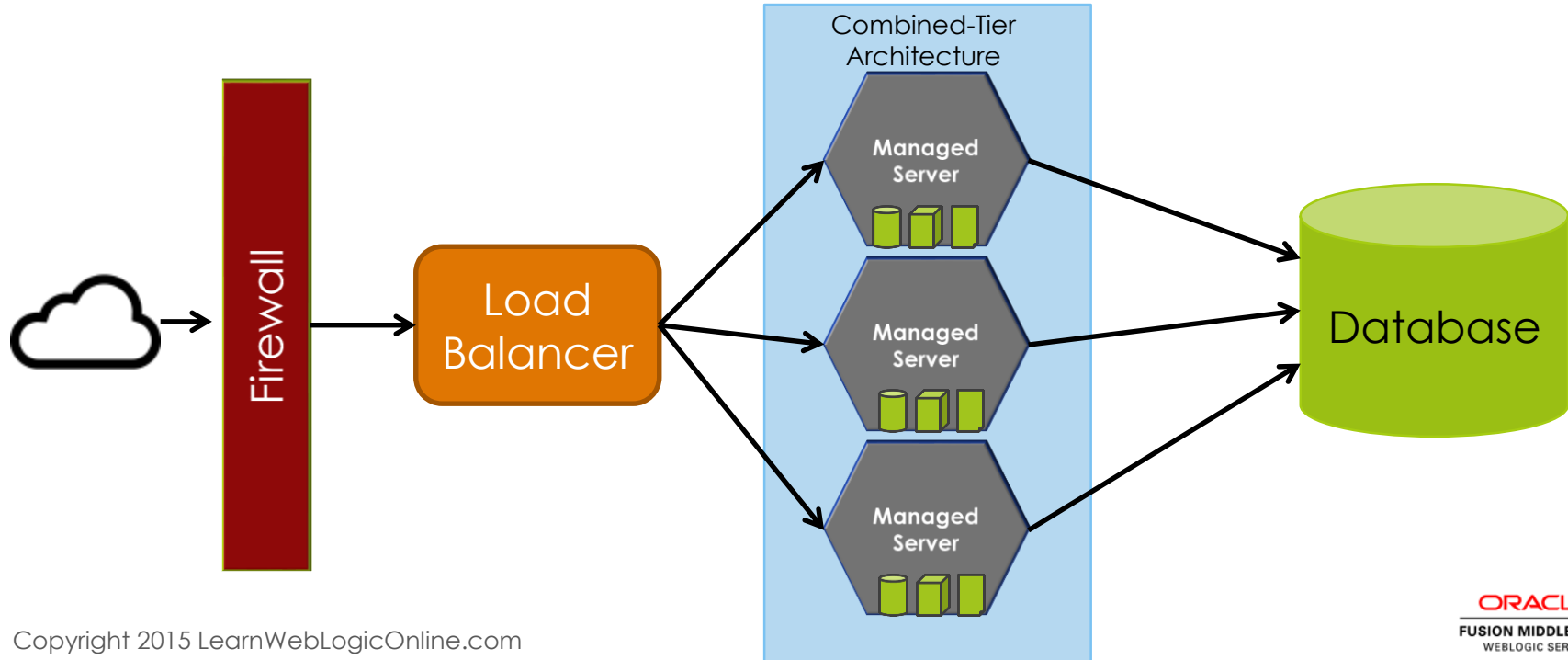
# What can be Clustered

- Servlets
- JSPs
- EJBs
- RMI objects
- JMS resources
- JDBC connections
- Coherence clusters and servers
- Timer services

# Cluster Communications

- IP Multicast uses UDP broadcast
- IP Unicast uses TCP/IP sockets

# Basic Cluster Architecture



# Load Balancing

- Servlets and JSPs
- EJBs and RMI objects
- JMS



# Load Balancing HTTP Requests

- Proxy Plug-ins
  - Netscape
  - Apache
  - Oracle HTTP Server
  - Microsoft IIS
  - WebLogic Server with HttpClusterServlet
- Round-robin
- Supports HTTP session persistence

# Load Balancing: External LB

- Hardware LB supported
- Must support:
  - Passive cookie persistence
  - Active cookie persistence
  - SSL persistence

# Load Balancing EJBs and RMI

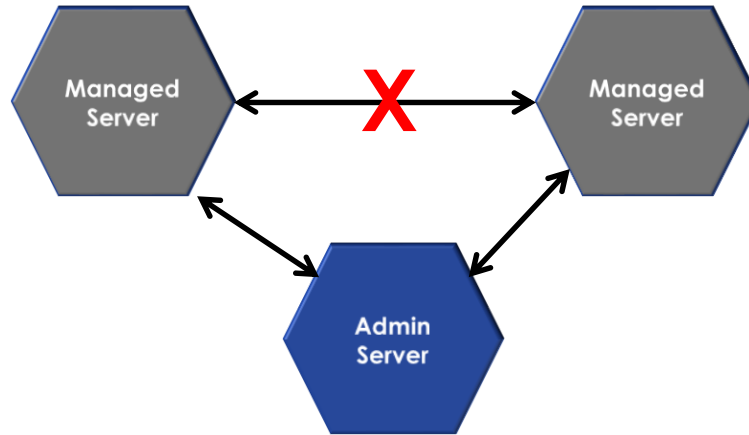
- Round Robin
- Weight-based
- Random
- Server Affinity

# Load Balancing JMS

- Server affinity with distributed destinations
- Target multiple JMS servers to migratable target
- Target Connection Factory to multiple targets

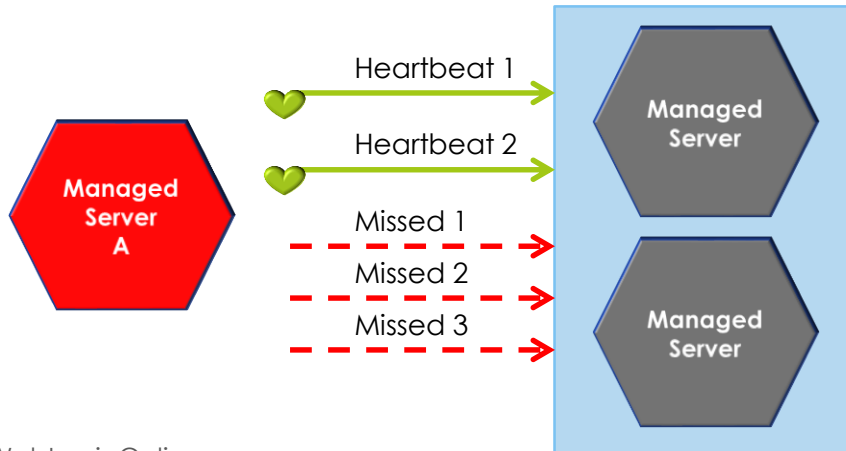
# Detecting Failures in a Cluster #1

- Socket connections to a peer server



# Detecting Failures in a Cluster #2

- Heart beat messages
  - Broadcast every 10 seconds
  - 3 missed heartbeats = failed server



# Failover for Servlets and JSPs

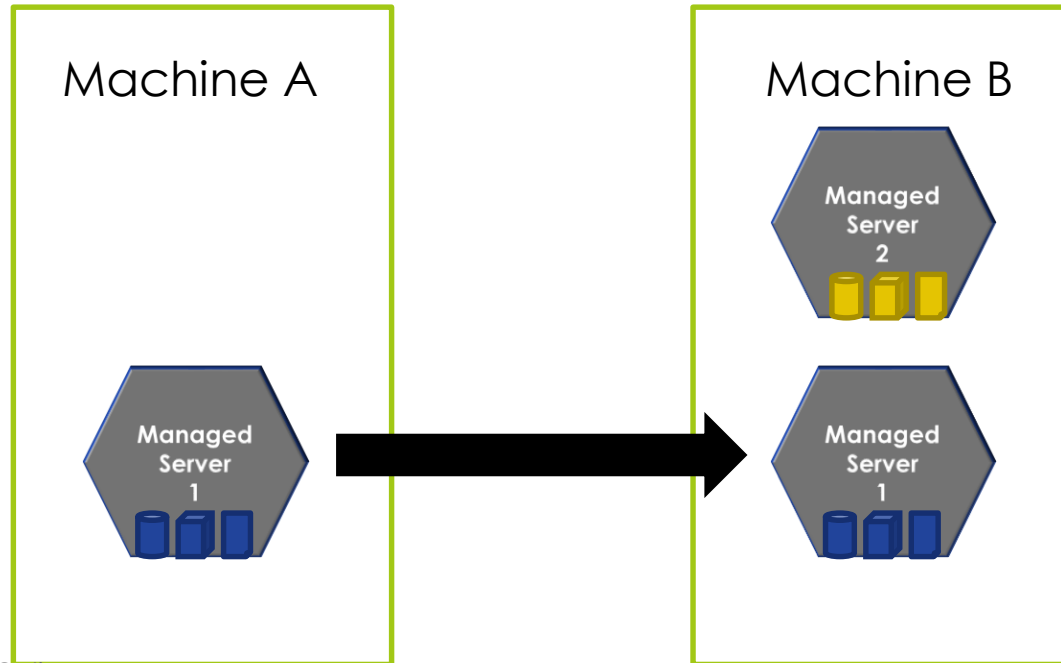
- Hardware load balancers
- Proxy plug-ins

# HTTP Session State Replication

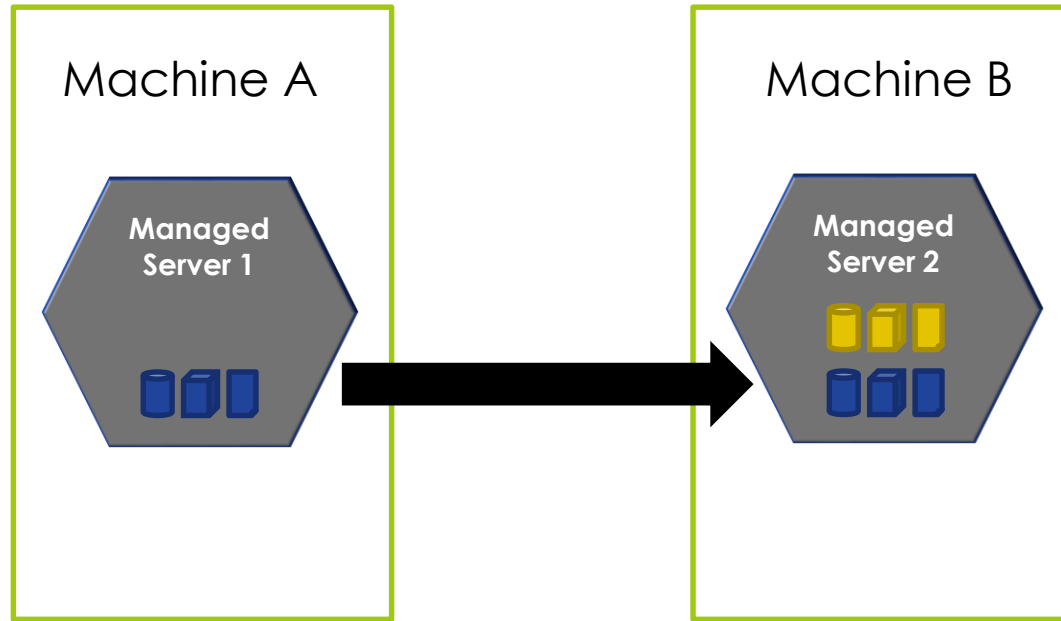
- In-memory
- JDBC-based
- Coherence\*Web



# Whole Server Migration



# Service-Level Migration



# Lab Exercise

- ▣ Refer to course material for

## **Lab Exercise #10: Clusters**

# Managing Server Lifecycle

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# What is Node Manager

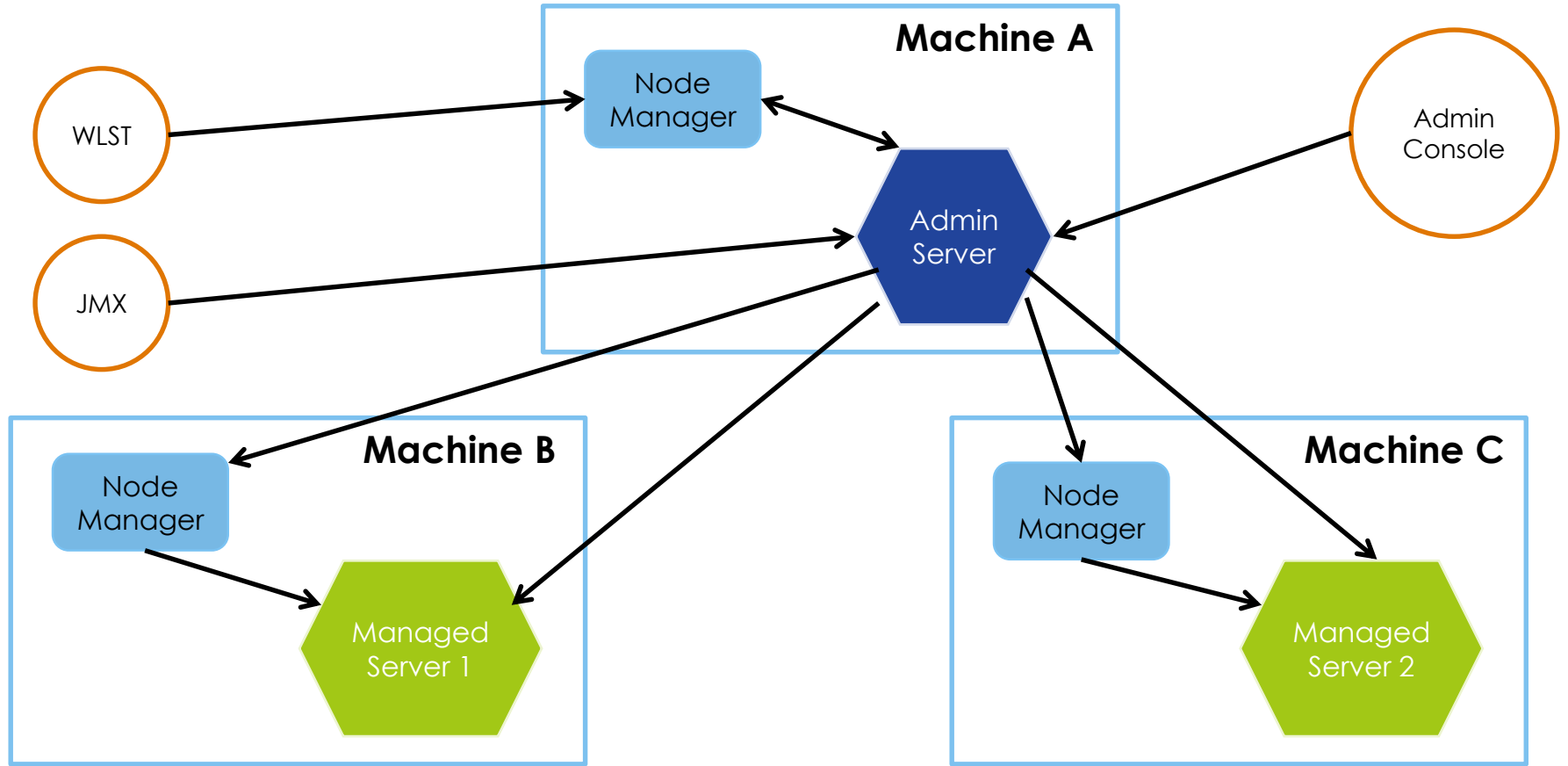
- WebLogic utility
- Remotely control WebLogic servers
- Optional but very convenient

# Node Manager Features

- Start, shutdown and restart Admin Server
- Start, shutdown, suspend, and restart Managed Servers
- Restart failed servers

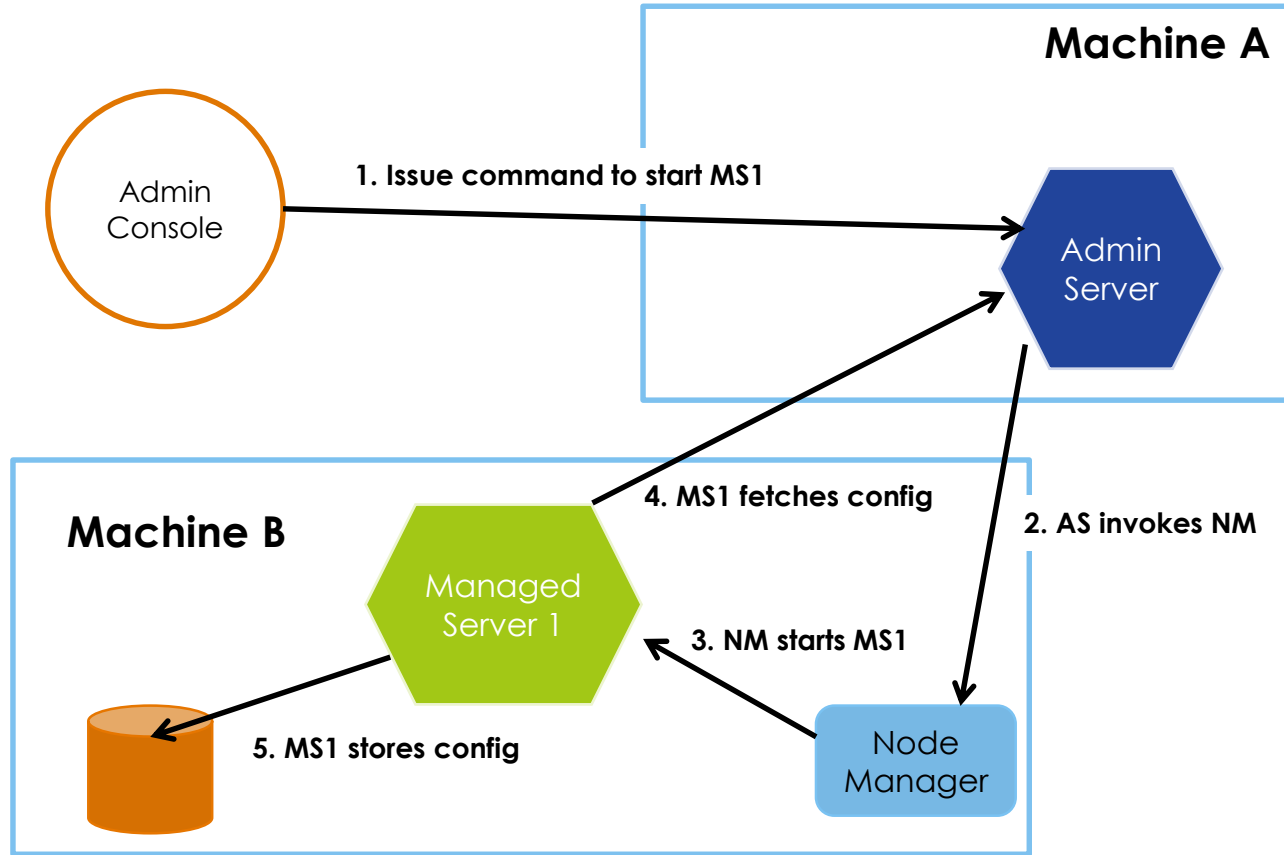
# Implementations

- Java-based Node Manager
- Script-based Node Manager





# Starting a Managed Server



# Configuring Node Manager

- `nodemanager.properties` – general config
- `nodemanager.domains`
- `nm_password.properties`
- `boot.properties`

# Lab Exercise

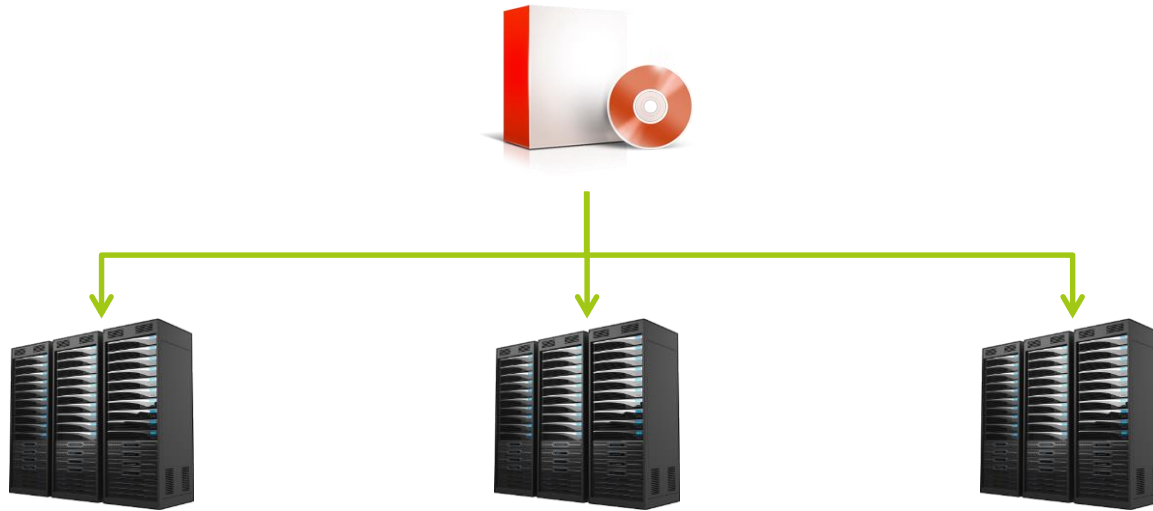
- Refer to course material for

## **Lab Exercise #12: Node Manager**

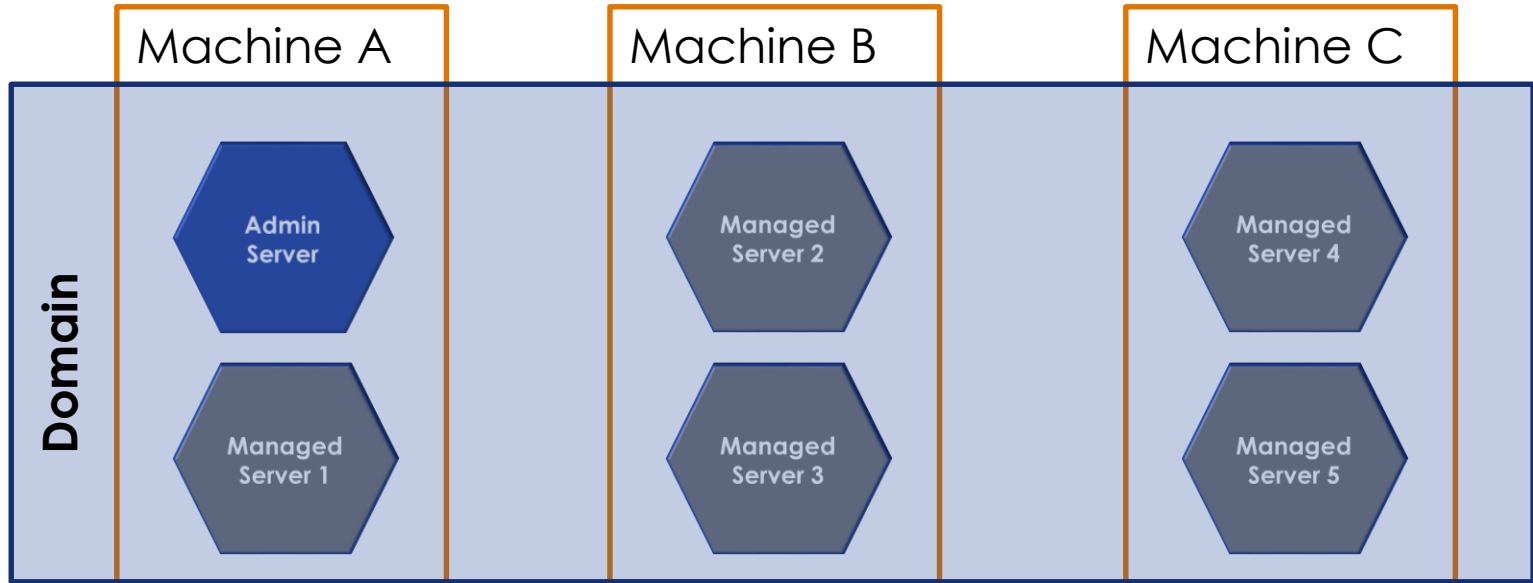
# Scaling out WebLogic

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# The Real World



# The Real World



# Tools for Deployment

- Managed server templates
- Pack / Unpack commands

# The Process

1. Create WebLogic machines
2. Create and assign managed servers
3. Install WebLogic on all machines
4. Create managed server template using pack command
5. Unpack template on each machine



# Lab Exercise

- Refer to course material for

## **Lab Exercise #12: Distributed Deployment**

# WebLogic Security

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# Secure the Host – User Accounts

- Use OS permissions to protect data stored on disk
  - security LDAP, persistent stores, keystores
- Limit number of user accounts
- Create an OS group to only contain:
  - Installation user
  - Domain creation and Node Manager user
  - Restrict access to Oracle home, WebLogic home, Domain home

# Secure Installation

- Do not install the sample applications and code
- Remove Derby Database after installation
- Apply latest CPU from Oracle

# Creating a Secure Domain

- Production mode
- Omit credentials when issuing WLST commands

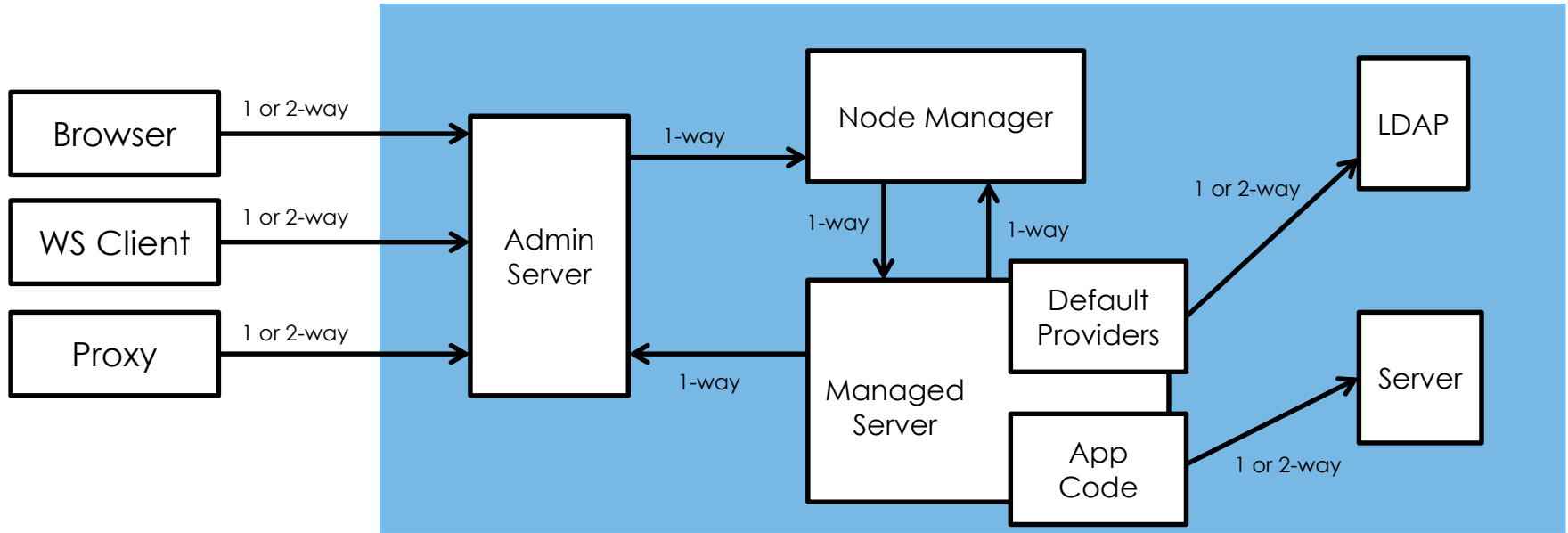
# Securing a Domain

- Configure password validation rules
- Configure user lockout
- Configure node manager security
- Enable auditing
- Disable remote Mbean access
- Set message timeout
- Use SSL

# Domain-wide Admin Port

- Separates admin traffic from application traffic
- Requires SSL
- Reduces risk for transmitting server config information in plain text
- Provides a dedicated port and listening thread
  - Helpful during a DoS attack

# SSL in WebLogic





# Security Realms

- Security Providers
- Users, groups, security roles
- Policies

# Users

- Entities authenticated against security realm
- Person, client application, WLS instance
- User is assigned an identity
- Associated with groups or roles

# Groups

- Logically ordered sets of users
- By function or department
- Easier to manage groups than users

# Security Roles

- Privilege granted to users or groups
- Dynamic
- Can be scoped to an application unlike groups

# Security Policies

- Protects resources
- Association between resource and user/group/role
- Policy conditions define when/how policy is enforced

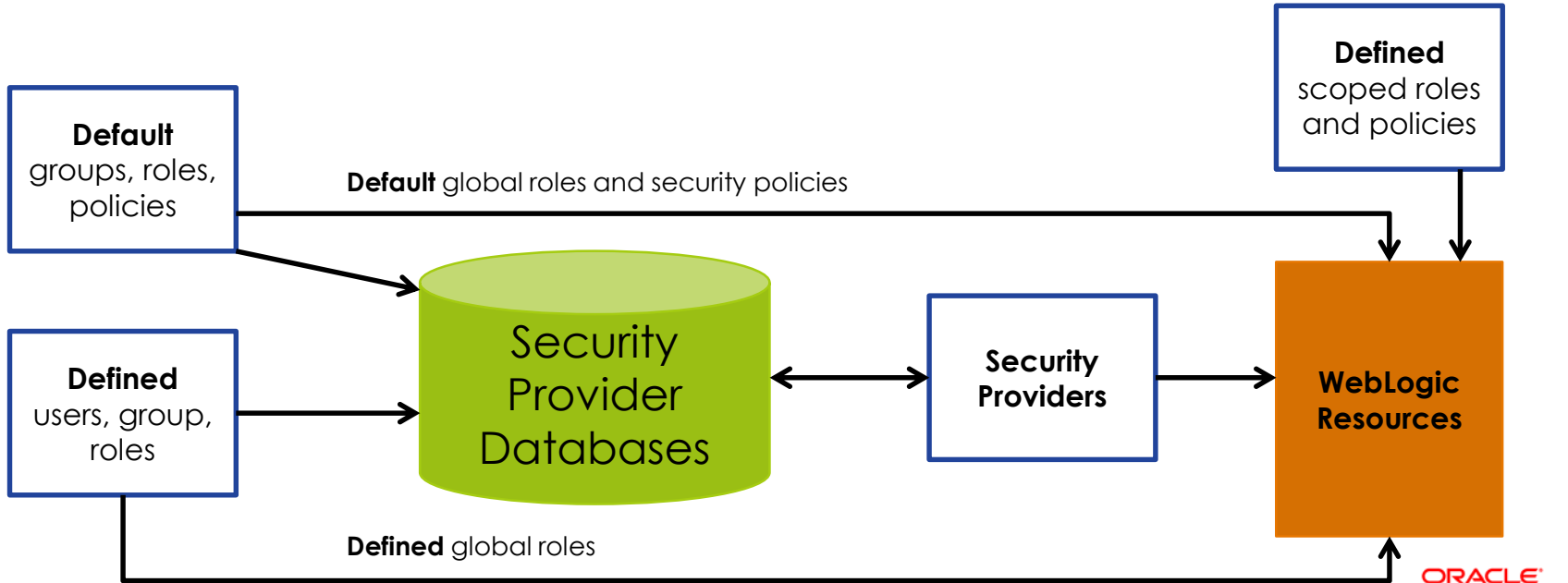
# Security Providers

- Provide security services to protect resources
- Default, third-party, custom developed

# Security Providers

- **Authentication**
- Identity Assertion
- Principal Validation
- Authorization
- Adjudication
- Role Mapping
- Credential Mapping
- Certificate Lookup and Validation
- Auditing

# Security Provider Database





# Security Provider Database

- Embedded LDAP Server
  - Production Quality
  - Supports 10,000 or fewer users
- RDBMS Security Store

# Authentication Provider

- Default WebLogic Authentication Provider
  - Embedded LDAP
  - Stores users, groups, roles, policies

# Lab Exercise

- Refer to course material for

## **Lab Exercise #9: Security Realm**

# Intro to WLST

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# What is WebLogic Scripting Tool?

- Command-line scripting environment
- Create, manage, and monitor domains
- Based on Jython
- Set of WL-specific scripting functions

# Online and Offline Modes

- Online

- Connect to running Admin Server
- Manage security data, configuration of active domain

- Offline

- Create and extend domains

# Command Types

- Browse
- Control
- Customization
- Deployment
- Diagnostics
- Editing
- Information
- Life Cycle
- Node Manager
- Tree
- Persistent Store

# Mbeans

- Managed Java object
- Follows JMX design specification
- Represents an application or WebLogic resource
- Exposes: attributes and operations



# Mbean Hierarchy

- Organized like a file system with a root directory
- Mbean hierarchy = disk drive
- Mbean types and instances = directories
- Mbean attributes and operations = files

# Different Hierarchies

- Configuration (Domain and Server)
- Runtime (Domain and Server)

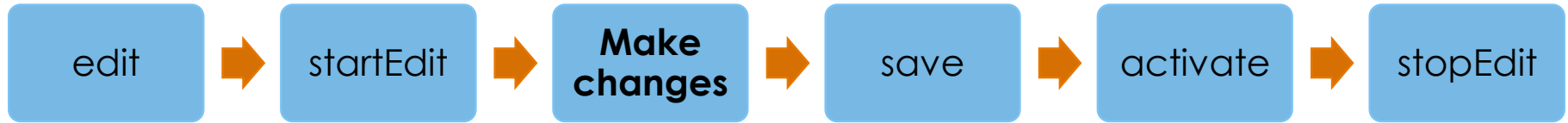
# Navigating MBeans

- Connect to domain (offline or online)
- Use `cd()`, `ls()`, `pwd()` commands

# Locating MBeans

- Use `find()` to search based on name or type
  - Returns list of Mbean paths
- Use `getpath()` to return Mbean object

# Editing Mbeans Online



# Interactive WLST

- Invoke interpreter using wlst.sh

```
cd ORACLE_HOME/oracle_common/common/bin  
./wlst.sh
```

# Connect to running Domain

- Start interactive WLST

- Use `connect()`

- `connect([username, password], [adminServerName], [url], [timeout])`

```
wls:/offline> connect('adminusername', 'adminpassword', 't3://localhost:7001')
```

# WLST Example

```
[1]      connect("username","password")
[2]      edit()
[3]      startEdit()
[4]      svr = cmo.createServer("managedServer")
[5]      svr.setListenPort(8001)
[6]      svr.setListenAddress("address")
[7]      save()
[8]      activate(block="true")
```



# Lab Exercise

- ▣ Refer to course material for

- ▣ **Lab Exercise #13: WLST**

# Course Conclusion

Course: Oracle WebLogic for Administrators

# What We've Learned

- Install WebLogic
- Create a domain
- Admin Console
- Create WebLogic resources (JDBC, JMS)
- Security
- Deploying and managing applications
- Clusters
- Node Manager
- WLST

# What's Next – Future Lectures

- Dedicated courses on focused topics
  - Advanced security, JMS, JDBC, Clusters, Performance Tuning
- Other Fusion Middleware products (SOA 12c, BPM, IDM)
- Developer Tools
  - Sandbox and SDLC support

# Thank you!