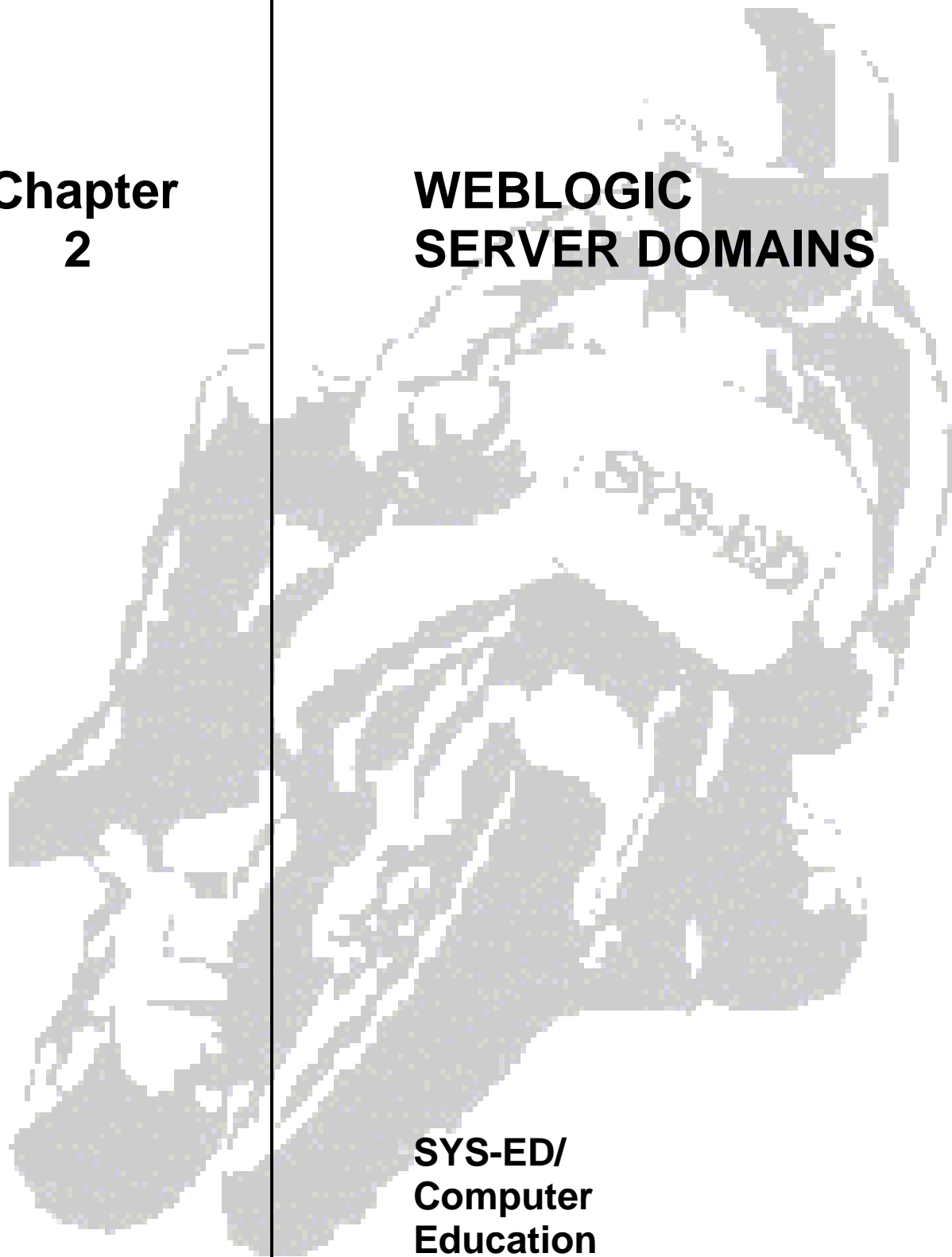


**Chapter
2**

**WEBLOGIC
SERVER DOMAINS**



**SYS-ED/
Computer
Education
Techniques, Inc.**

Objectives

You will learn:

- Domain - concept and implementation.
- Content of a domain.
- Common domain types.
- Production versus development mode.
- Domain creation.
- Administration Server.
- Domain restrictions.
- Directory structure.
- Managed servers and clustered Managed Servers.
- Resources and services.
- Server root directory.

1 Domain

A domain is the basic administration unit for WebLogic Server instances. It consists of one or more WebLogic Server instances and their associated resources.

- Multiple domains can be created based on different system administrators' responsibilities, application boundaries, or geographical locations of servers.
- A single domain can be used to centralize all WebLogic Server administration activities.

Each domain's configuration is stored in a separate configuration file called config.xml, which is stored on the Administration Server along with other files such as logs.

When the Administration Server is used to perform a configuration task, the changes apply only to the domain managed by that Administration Server.

The management of a domain is specific to the Administration Server for that domain. Accordingly, this means that server instances, applications, and resources in one domain should be treated as being independent of servers, applications, and resources in a different domain.

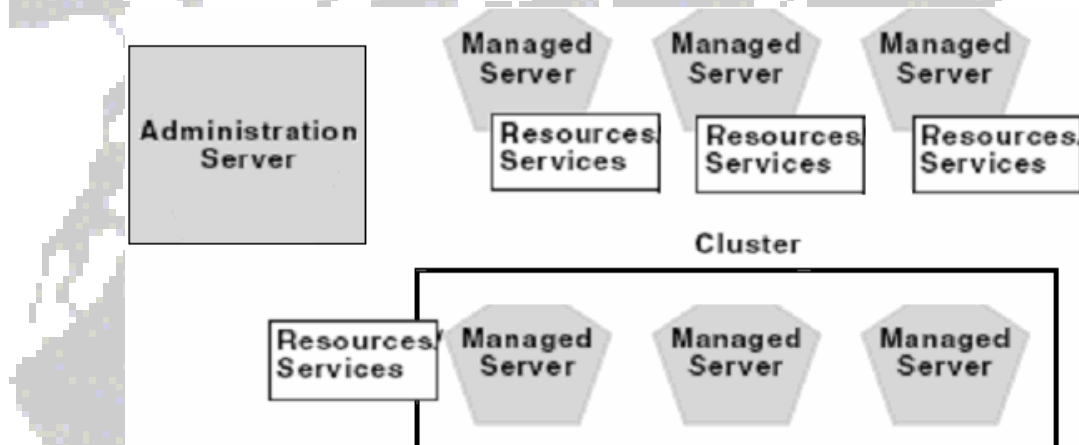
It is not possible to perform configuration or deployment tasks in multiple domains at the same time.

1.1 Contents of a Domain

A domain can include multiple WebLogic Server clusters and non-clustered WebLogic Server instances. The scope and purpose of a domain can vary significantly.

A minimal domain can contain only one WebLogic Server instance, which functions both as an Administration Server, and as a Managed server.

Production Environment: 4 standalone Managed Servers, and a cluster of 4 Managed Servers.



1.2 Production and Development Modes

A domain can be started in one of two modes.

Development Mode	Is used while developing applications.
Production Mode	Utilizes a security configuration and allows auto-deployment of applications.

Production mode is used when the application is running in its final form. A production domain uses full security and may use clusters or other advanced features.

2 Domain Creation - New

There are several ways of creating a new domain.

2.1 Domain Creation Wizard

BEA recommends that the Configuration Wizard be used for creating a new WebLogic Server domain. It will provide interactive queries about the type of domain required and creates the config.xml file, start scripts, and other files used in a domain.

The Configuration Wizard can be used to:

- Create a domain with a single WebLogic Server instance for use in a development environment.
- Create a domain with one or more Managed Servers.
- Create a domain with one or more clusters.
- Configure JDBC connection pools, DataSources, and MultiPools.
- Configure JMS.
- Add users to the security realm.
- Create a domain based on a configuration template.

A configuration template defines the full set of resources within a domain, including infrastructure components, applications, services, security options, and general environment and operating system options. BEA provides configuration templates; or a custom template can be created.

3 webLogic.Server Command

When a WebLogic Server instance is started from a directory that does not contain a config.xml file, the server automatically creates a default configuration, including start scripts and the config.xml file, in the directory from which the server instance has been started. The domain configuration can then be modified using the Administration Console or other system administration tools.

To create a domain using the weblogic.Server command:

1. Open a command shell.
2. Set the CLASSPATH to include the WebLogic Server classes. This can be done by setting the CLASSPATH to run the setWLSEnv.cmd (Windows) or the setWLSEnv.sh (UNIX) script.

The script is located in the WebLogic Server installation at:

```
BEA_Home/weblogic81/server/bin
```

3. Run the following command:

```
java weblogic.Server
```

When prompted for a username and password, enter the values.

The following message will be on screen:

```
Would you like the server to create a default configuration and boot?  
(y/n)
```

In order to specify a name for a domain add the -Dweblogic.Domain option to the start command.

Example:

```
java -Dweblogic.Domain=SYSED weblogic.Server
```

This will create a domain called "SYSED".

Answer Y.

You will be asked to confirm the password.

4. Enter the same password you entered in step 3. The server starts and creates a default config.xml file in the directory from which you ran the java weblogic.Server command.

The server will create a Boot Identity file, called boot.properties, that contains the username and password entered in step 3. When this file is present in the domain's root directory, the server does not prompt for a username and password during startup.

3.1 Ant Tasks

A new domain configuration can be created using Ant scripts by running the wlserver and wlconfig Ant tasks.

4 Administration Server

Each WebLogic Server domain must have one server instance that acts as the Administration Server.

The Administration Server is used programmatically, via the Administration Console, or using the command line to configure all other server instances and resources in the domain.

Before the Managed Servers are started in a domain, the Administration Server should be started. When a standalone or clustered Managed Server is started, it contacts the Administration Server for its configuration information.

This start-up sequence will provide the appropriate framework for the Administration Server to operate as the central control entity for the configuration of the entire domain.

The services of the Administration Server are invoked as follows:

Service	Description
WebLogic Server Administration Console	A browser-based graphical user interface used for configuring a domain.
WebLogic Server Application Programming Interface - API	The API provided with WebLogic Server can be used for writing a Java class to modify configuration attributes.
WebLogic Server command-line utility	Provides for the creation of scripts to automate domain management.
SNMP	The Simple Network Management Protocol, versions SNMPv1 and SNMPv2 can be used for monitoring a WebLogic Server domain.

Whichever method is used, the Administration Server for a domain must be running to modify the domain configuration.

When the Administration Server starts, it loads the config.xml for the domain; it will look for the config.xml in the current directory. When a new domain is created using the Configuration Wizard, the domain location can be specified.

The default location for the domain is placed at:

```
BEA_HOME/user_projects/domains/mydomain
```

Where mydomain is a domain-specific directory, with the same name as the domain.

Each time the Administration Server starts successfully, and each time the configuration is modified, a backup configuration file is created. The number of backup copies of config.xml retained by the Administration Server can be configured.

4.1 Administration Server Failure

The failure of an Administration Server for a domain does not affect the operation of Managed Servers in the domain.

- If an Administration Server for a domain becomes unavailable while the server instances it manages - clustered or otherwise - are up and running, those Managed Servers continue to run.
- If the domain contains clustered server instances, the load balancing and failover capabilities supported by the domain configuration remain available, even when the Administration Server fails.
- If an Administration Server fails because of a hardware or software failure on its host machine, other server instances on the same machine may be similarly affected.
- The failure of an Administration Server will not necessarily result in the interruption of the operation of Managed Servers in the domain.

5 Managed Servers and Clustered Managed Servers

In a domain, server instances other than the Administration Server are referred to as Managed Servers.

- Managed Servers host the components and associated resources which comprise the applications.
- When a Managed Server starts up, it connects to the domain's Administration Server to obtain configuration and deployment settings.
- Managed Servers in a domain can start up independently of the Administration Server if the Administration Server is unavailable.
- Two or more Managed Servers can be configured as a WebLogic Server cluster to increase application scalability and availability.
- In a WebLogic Server cluster, most resources and services are deployed to each Managed Server, as opposed to a single Managed Server, enabling failover and load balancing.
 - A non-clustered Managed Server is created and added to a cluster by configuring pertinent configuration parameters for the server instance and the cluster using the Administration Console or other system administration tools.
 - A Managed Server can be removed from a cluster by re-configuring the parameters appropriately.
 - The major difference between clustered and non-clustered Managed Servers is support for failover and load balancing -these features are available only in a cluster of Managed Servers.

Recommendation:

The requirements for scalability and reliability drive the decision on whether or not to cluster Managed Servers.

6 Resources and Services

In addition to the Administration Server and Managed Servers, a domain contains the resources and services required by Managed Servers and hosted applications deployed in the domain.

Domain-level resources include:

Machine definition for identifying a specific computer	The information is used by Node Manager in restarting a failed Managed Server, and by a clustered Managed Server in selecting the best location for storing replicated session data.
Network channels	Resources that can be used to define default ports, protocols, and protocol settings. After creating a network channel, it can be assigned to any number of Managed Servers and clusters in the domain.

Managed Servers in the domain host their own resources and services. Resources and services can be deployed to selected Managed Servers or to a cluster.

Examples: Deployable Resources

- Application components, such as EJBs, Web Applications, J2EE Connectors and Enterprise Applications
- Startup and shutdown classes
- JDBC connection pools
- JMS servers
- Virtual hosts

7 Common Domain Types

There are two basic types of domains:

- | | |
|-------------------------------|----------------------------|
| • Domain with Managed Servers | • Standalone Server Domain |
|-------------------------------|----------------------------|

7.1 Domain with Managed Servers

A simple production environment will consist of a domain with:

- Several Managed Servers that host applications.
- Administration Server to perform management operations.

In this configuration, applications and resources are deployed to individual Managed Servers. Clients that access the application connect to an individual Managed Server.

Production environments that require increased application performance, throughput, or availability may configure two or more of Managed Servers as a cluster. Clustering allows multiple Managed Servers to operate as a single unit to host applications and resources.

7.2 Standalone Server Domain

For development or test environments, it may be preferable to deploy a single application and server independently from servers in a production domain.

A simple domain consisting of a single server instance which acts as an Administration Server and hosts the applications that are being developed and being prepared for deployment. This kind of domain is called a standalone server domain.

In production environments, applications should be deployed only on Managed Servers in the domain. The Administration Server should be reserved for management tasks.

8 Domain Restrictions

Many WebLogic Server installations consist of a single domain that includes all the Managed Servers required to host applications.

If more than one domain is created, the following restrictions apply:

- Each domain requires its own Administration Server for performing management activities.

In order to manage another domain, the Administration Console hosted by the Administration Server of that domain must be started, or the URL of the Administration Server must be included in the command line arguments.

- All Managed Servers in a cluster must reside in the same domain; a cluster can not be split over multiple domains.
- A configured resource or subsystem cannot be shared between domains.

9 Directory Structure

9.1 config.xml File

The configuration of a domain is stored in the config.xml file. It is possible to specify a different name by specifying a command line option when the Administration server is started.

- The config.xml file specifies the name of the domain and the configuration parameter settings for each server instance, cluster, resource, and service in the domain.
- The config.xml file must exist in the Server Root Directory of the Administration Server.
- The Server Root Directory contains default script files that can be used to start the Administration Server and Managed Servers in the domain.

9.2 Domain Directory Structure

In releases of WebLogic Server prior to version 7.0, domain directories were created within the directory structure of the WebLogic Server installation. With WebLogic Server 8.1, the domain directories can be setup outside the product installation directory tree, in any location on the file system that has access to the WebLogic Server installation and the JDK.

When the Configuration Wizard is used to create a domain, by default it creates the user_projects/domains directory in the BEA Home directory as a container for the domains. It is possible to specify a different directory anywhere on the file system. The creation of a different directory also creates a root directory for the new domain and any other directories specified in the domain template.

The domain directory structure created by the Configuration Wizard contains:

- A domain root directory with the same name as the domain, such as mydomain or training.

This directory will contain:

- The config.xml file for the domain.
- Scripts you use to start server instances and establish your environment.
- A subdirectory for storing applications for the domain, typically named applications..

In order to use the WebLogic Server's auto-deployment feature, the subdirectory for applications must be named applications. The auto-deployment feature for applications is available only when a domain is running in development mode,

When a server instance is started in a domain for the first time, WebLogic Server creates the following subdirectories in the domain directory:

- Files containing security information.
 - A logs directory for storing domain-level logs.
 - A directory for each server running in the domain, for storing server logs and HTTP access logs.

Other directories within the domain directory structure can be created, as desired.

9.3 Server Root Directory

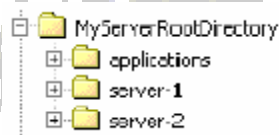
All instances of WebLogic Server use a server root directory to store runtime data and provide the context for any relative pathnames in the server's configuration. When starting a WebLogic Server instance for the first time, a subdirectory is created for each server instance under the server root directory. These subdirectories contain log files, security data, administrative data, and other files used by the server instance.

The path and name of the server root directory can be specified for each server instance. A common server root directory can be specified for multiple server instances hosted on a single computer or a different server root directory can be specified for each server. A domain may have one or more server root directories.

The server root directory may also contain a subdirectory called applications that is used for auto-deployment of applications when a domain is running in development mode.

Example:

The server root directory is called MyServerRootDirectory.



WebLogic Server instances named server-1 and server-2 each have their own subdirectory under the server root directory. The name of these subdirectories is the name of the server as defined in the domain's configuration.

9.4 Specifying a Server Root Directory

The path for the server root directory can be specified by:

- Using the `-Dweblogic.RootDirectory=path` option when starting a WebLogic Server instance from command line.

Example:

```
java -Dweblogic.RootDirectory=c:\MyServerRootDirectory weblogic.Server
```

Will start a WebLogic Server instance and use `c:\MyServerRootDirectory` as the server root directory.

- Using Node Manager to start a WebLogic Server instance, a server root directory can be specified with the `Root Directory` attribute in the Administration Console on the `Server --> Configuration --> Remote Start` tab.

When one of these techniques is not used to specify a server root directory, the path and name of the server root directory will depend on whether:

- A server instance is a Managed Server or the Administration Server.
- The Node Manager is used for starting the server instance.

9.5 Server Root Directory for an Administration Server

An Administration Server uses its server root directory as a repository for the domain's configuration data - config.xml and security resources - embedded LDAP server.

To determine the root directory for an Administration Server, WebLogic Server does the following:

- If the server's startup command includes the `-Dweblogic.RootDirectory=path` option, then the value of path is the server root directory.
- If `-Dweblogic.RootDirectory=path` is not specified, and if the working directory contains a config.xml file, then the working directory is the server root directory.

If neither of the previous statements is true, then the server looks for a config.xml file in `working-directory/config/domain-name`.

If it finds config.xml in this directory, then `working-directory/config/domain-name` is the server root directory.

If WebLogic Server cannot find a config.xml file, then it offers to create one. This method is used to create a new domain.

9.6 Server Root Directory for a Managed Server Started with Node Manager

If the Node Manager is used to start a Managed Server, the root directory is located on the computer that hosts the Node Manager process.

In order to determine the location of the server's root directory, WebLogic Server does the following:

- If a root directory has been specified in the Administration Console on the Server -->Configuration --> Remote Start tab, then the specified directory is the server root directory.
- If a root directory has not been specified in the Administration Console, then the server root directory is:

```
BEA_HOME\WL_HOME\common\nodemanager
```

where:

- BEA_HOME is the directory where you installed one or BEA products, including WebLogic Server
- WL_HOME is the directory in which you installed WebLogic Server on the Node Manager's host computer (weblogic81 by default)

The server root directory for a Managed Server started with Node Manager directory contains a subdirectory for each Managed Server instance. The name of the subdirectory is the name of the server as defined in the domain configuration.

9.7 Server Root Directory for a Managed Server Not Started with Node Manager

If the Node Manager is not used to start a Managed Server and rather instead the `java weblogic.Server` command or a script that calls that command is used, then WebLogic Server will do the following to determine the root directory:

- If the server's startup command includes the `-Dweblogic.RootDirectory=path` option, then the value of `path` is the server's root directory.
- If `-Dweblogic.RootDirectory=path` is not specified, then the working (current) directory is the root directory.

In order to make it easier to maintain the domain configurations and applications across upgrades of WebLogic Server software, it is recommended that the server root directory not be the same as the installation directory for the WebLogic Server software.