ORACLE

WebLogic Scripting Tool

Agenda

- Intro to WebLogic Scripting Tool (WLST)
- WLST Offline
- WLST Online
  - JMX Client
  - Deployment (JSR-88) Client
  - Miscellaneous Clients - Node Manager, JNDI, etc.
- Customizing WLST
- Tips and Best Practices

WebLogic Scripting Tool (WLST)

- Scripting tool for administering a domain (create, configure, manage, monitor, deploy applications)
- Based on Jython – pure Java implementation of Python
- Great for automating repetitive tasks
- Heavily used by customers and within Oracle

Interaction Modes

- **Interactive**
  - enter a command and view the response at a command-line prompt
  - In online mode: shell maintains a persistent connection to a WLS instance
- **Script**
  - text file with a .py file extension
  - executed using Jython commands for running scripts
  - invoke a sequence of WLST commands without requiring your input
- **Embedded**
  - instantiate the WLST interpreter in your Java code
  - execute WLST commands from a Java program

Connection Modes

- **Offline**: analogous to the Configuration Wizard
  - Uses the Offline Configuration Framework
    - Also used by the Configuration Wizard
    - Consistent results when using either tool
  - read and write access to the configuration data that is persisted in the domain's config directory or in a domain template JAR
  - Intended to create a domain or modify a non-running domain
  - Used during WLS install to create samples domains

- **Online**: analogous to the Administration Console
  - JMX client
  - Interacts with a server's MBeans
  - Intended as a runtime management tool: configuration, management, deployment, monitoring

WLST Offline Can/Can't Do

Can Do:

- Create/modify templates
- Create domains
- Extend domains
- Access and modify the configuration for an offline domain

Can't Do:

- View runtime performance data
- Modify security data

WLST Online Can/Can't Do

Can Do:

- Change configuration
- View runtime data
- Deploy applications
- Start and stop servers

Can't Do:

- Create a domain (must be offline mode)

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WLST Offline

- Uses the Offline Configuration Framework
  - Also used by the Configuration Wizard; Consistent results when using either tool
- Uses domain templates to create a domain
  - Several shipped with WLS
  - Create your own using Template Builder
  - Modify an existing template using WLST Offline
- Intended to create a domain or modify a non-running domain
- Used during WLS install to create samples domains
- Used by WL Platform products for creating domain configurations (use specific templates for each product)

Note: Do not use WLST offline to manage the configuration of an active domain. Offline edits are ignored by running servers and can be overwritten by JMX clients such as WLST online or the WebLogic Server Administration Console.

WLST Offline – Two Models: Templates and Scripts

- Templates (put everything in the template)
  - Use Template Builder to capture current domain configuration and artifacts into a rich template
  - Use that template to create new domains, migrate from dev to production
  - Bundles required files
  - Used by WebLogic Platform products

- Scripts (put little in the template and most in scripts)
  - Use more basic templates for domain creation
  - Use WLST scripts along with some predefined or custom domain templates to create the target domain
  - Modify/customize domain configuration through scripts, and effectively track configuration changes through source control

Recommended for:
- Out of the box config for a layered product

Reason: domain is self-contained

Recommended for:
- Customer configuration migration
- QA automation

Reason: easily make and track changes to a domain config

Starting WLST

- Setup the environment:
  - setWLSEnv.sh/cmd – sets path and classpath
  - Adds WebLogic Server classes to the CLASSPATH and WL_HOME\server\bin to the PATH
- Invoke WLST:
  - java weblogic.WLST

  or
  - java weblogic.WLST c:\myscripts\myscript.py
- Starts in Offline mode

Creating a Domain (WLST Offline)

- **Syntax**
  - createDomain(domainTemplate, domainDir, user, password)
- **Example**
  - wls:/offline> createDomain('c:/bea/wlserver_103/common/templates/domains/wls.jar','c:/mydomain', 'weblogic', 'weblogic')

Changing a Domain in WLST Offline

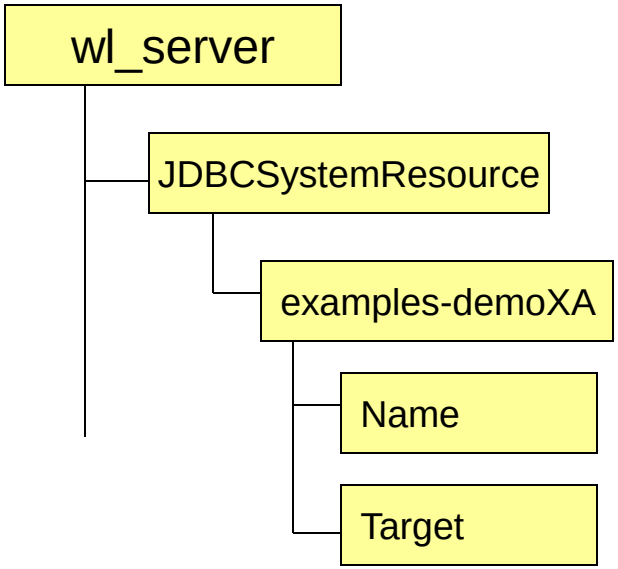
Step	Syntax
1. Open a domain for editing	`readDomain(`*`domainDirName`*`)`
2. Extend the domain (optional)	`addTemplate(`*`templateFileName`*`)`
3. Make changes (optional)	`Various commands`
4. Save	`updateDomain()`
5. Close the domain for editing	`closeDomain()`

Browsing and Editing in WLST Offline

- Browsing:
  - `cd(),ls()`
- Editing:
  - Add an application to a domain:
    - `addTemplate(templateFileName)`
  - Create and delete management objects:
    - `create(name, childMBeanType)`
    - `delete(name, childMBeanType)`
  - Get and set attribute values:
    - `get(attrName)`
    - `set(attrName, value)`
  - Set domain creation or update options:
    - `setOption(optionName, value)`
  - Load SQL files into a database:
    - `loadDB(dbVersion, connectionPoolName)`

WLST Offline – accessing a domain

- Offline – reading a domain:
  - `readDomain('c:/bea/user_projects/domains/medrec')`
- Domain configuration data is a collection of XML documents that expresses a hierarchy of management objects
- WLST represents this hierarchy as a file system
  - The root is the management object that represents the WebLogic Server domain (domain directory)
  - Each managed-object type is a sub directory of the root
  - Each instance of the type is a subdirectory under the type directory
  - Each management attribute and operation is a file within a directory



Syntax

- Command names and arguments are case sensitive.
- Enclose arguments in single or double quotes. For example, 'newServer' or "newServer".
- If you specify a backslash character (\) in a string, either precede the backslash with another backslash or precede the entire string with a lower-case r character.
  - For example when specifying a file pathname that contains a backslash:
    - `readTemplate('c:\\userdomains\\mytemplates\\mytemplate.jar')` or `readTemplate(r'c:\userdomains\mytemplates\mytemplate.jar')`
- When using WLST offline, the following characters are not valid in names of management objects: period (.), forward slash (/), or backward slash (\).
  - If you need to cd to a management object whose name includes a forward slash (/), surround the object name in parentheses. For example:
    - `cd('JMSQueue/(jms/REGISTRATION_MDB_QUEUE)')`

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WLST Online

- Analogous to the Administration Console, but without the GUI
- JMX client; maintains a persistent connection
- Interacts with a server's/domain's MBeans
- Intended as a runtime management tool: configuration, management, deployment, monitoring

WLST Online – connecting to a domain

- Setup the environment:
  - setWLSEnv.sh (in WL_HOME\server\bin)
  - Adds WebLogic Server classes to the CLASSPATH and WL_HOME\server\bin to the PATH
- Invoke WLST:
  - java weblogic.WLST
- Starts in Offline mode
- Connect to a domain:
  - `wls:/offline> connect('weblogic','weblogic1','localhost:7001')`

Traversing MBean Trees

- Simpler than JMX – no need to know the JMX object name
- MBeans are hierarchical, similar to a file system, with the DomainMBean at the top of the tree
- Multiple MBean trees (described later)
- Use commands similar to Unix commands to traverse the tree:
  - `cd(),ls()`
- Syntax is the same as with WLST Offline

```
Domain MBean (root)
    |- - - MBean type (ServerMBean)
        |- - - MBean instance
          (ManagedServer1)
            |- - - MBean attributes &
              operations
              (AutoRestart)
        |- - - MBean instance
          (MedRecServer)
            |- - - MBean attributes &
              operations
              (StartupMode)
```

Available MBean Trees

- **domainConfig**
  - configuration hierarchy of the entire domain; represents the configuration MBeans in RuntimeMBeanServer
  - read only
- **serverConfig**
  - configuration hierarchy (configuration MBeans) of the server your are connected to
  - read only
- **domainRuntime**
  - hierarchy of runtime MBeans for the entire domain
  - read only
- **serverRuntime**
  - hierarchy of runtime MBeans for the server you are connected to
  - read only
- **edit**
  - writable domain configuration with pending changes; represents the configuration MBeans in the EditMBeanServer
- **jndi**
  - read-only JNDI tree for the server you are connected to
- **custom**
  - list of custom MBeans
  - can be hierarchical/grouped if MBeans use namespaces appropriately

Switching Between Trees

- Use the appropriate command to move to a different tree
  - domainConfig()
  - serverConfig()
  - domainRuntime()
  - serverRuntime()
  - edit()
  - jndi()
  - custom()
- When returning to a tree, you return to the place where you left, except custom and jndi (goes to the root)

Changing Configuration in WLST Online

Step	Syntax
1. Change to the edit tree	`wls:/wl_server/domainConfig> edit()`
2. Get an edit lock	`wls:/wl_server/edit> startEdit()`

3. Make changes	`wls:/wl_server/edit !> svr = cmo.createServer("managedServer")`
	`wls:/wl_server/edit !> svr.setListenPort(8001)`
	`wls:/wl_server/edit !> svr.setListenAddress("my-address")`

4. Save (and implicitly validate) your changes	`wls:/wl_server/edit !> save()`
5. Activate/distribute, release lock	`wls:/wl_server/edit !> activate()`

Current Management Object

- CMO variable – current management object
  - Java object that serves as a proxy for direct access to the WLS MBean
  - Makes it easy to directly interact with the MBean – get and set attributes, other commands
  - Always set to the current WLST path
  - Only available for WLS MBeans, not custom MBeans

- Example:
  - `wls:/mydomain/edit> cmo.setAdministrationPort(9092)`
  - (This example changes the Administration Port in the Domain MBean)

Deploying an Application

- In Online mode, use the deploy command to deploy applications
  - Syntax: deploy(appName, path, [targets], [stageMode], [planPath], [options])
  - deploy("mainWebApp","C:/samples/server/examples/build/mainWebApp“,”server-1”)
  - Note: You do not need to be in an edit session to deploy applications.
- Reminder: in Offline mode, add an application using an extension template

Common Online Deployment Commands

- deploy Deploy an application to a WebLogic Server instance.
- distributeApplication Copy the deployment bundle to the specified targets.
- redeploy Redeploy a previously deployed application
- startApplication Start an application, making it available to users.
- stopApplication Stop an application, making it unavailable to users.
- undeploy Undeploy an application from the specified servers.
- updateApplication Updates an application configuration using a new deployment plan.

- Returns a WLSTProgressObject to track the progress of the command
  - You query the progress object to get the status; (pull, not push)

Interacting with the Node Manager

- You can use WLST to do the following with Node Manager:
  - Start a Node Manager.
  - Connect to a Node Manager, then use the Node Manager to start and stop servers on the machine on which Node Manager is running.

- Preferred method:
  - Use the Node Manager to start the Administration Server
  - Connect to the Admin Server
  - Start Managed Servers using the standard WLST lifecycle commands
  - Enables you to start all servers in the domain with one connection, regardless of which machines host the Managed Servers

Common WLST Node Manager Commands

- **startNodeManager** – starts Node Manager on the current machine.
- **nm** - Determines whether WLST is connected to Node Manager
- **nmConnect** - Connects WLST to Node Manager to establish a session. (Specify domain and credentials)
- **nmDisconnect** - Disconnects WLST from a Node Manager session.
- **nmStart** - Starts a server in the current domain using Node Manager.
- **nmKill** - Kills the specified server instance that was started with Node Manager.

Managing Server Lifecycle with WLST

- You can also manage server lifecycle through WLST without directly using Node Manager.
- The following WLST lifecycle commands are available:
  - **startServer** - Start the Administration Server. (Online or Offline)
  - **start** - Start a Managed Server instance or a cluster using Node Manager.
  - **suspend** - Suspend a running server.
  - **resume** - Resume a server instance that is suspended or in ADMIN state.
  - **shutdown** - Gracefully shut down a running server instance or cluster.
  - **migrate** - Migrate services to a target server within a cluster.

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Customizing WLST

- Add custom commands by:
  - Creating the commands in a .py file
  - Add the file to the WLST home directory
  - WLST home directory – WL_HOME/common/wlst (by default)
- Add custom commands to another namespace:
  - Create the commands in a .py file
  - Add file to the WLST_home/**lib** directory
  - Execute commands using <module>.<command>

Support for Custom MBeans

- You can register custom MBeans and then access them using WLST in the “custom” MBean tree
- WLST treats all non-WebLogic Server MBeans as custom MBeans:
  - Instead of arranging custom MBeans in a hierarchy, WLST organizes and lists custom MBeans by JMX object name.
    - All MBeans with the same JMX domain name are listed in the same WLST directory. For example, if you register all of your custom MBeans with JMX object names that start with mycompany:, then WLST arranges all of your MBeans in a directory named mycompany.
  - Custom MBeans cannot use the cmo variable because a stub is not available.
  - Custom MBeans are editable, but not subject to the WebLogic Server change management process.
    - You can use MBean get, set, invoke, and create and delete commands on them without first entering the startEdit command.

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Reduce WLST Startup Time

- Cache directory for scanned files:
  - java -Dpython.cachedir="c:\demo\wlst_cache" weblogic.WLST
- New startup option in WLS 10.3: `-skipWLSModuleScanning`
  - Default behavior: on startup, WLST scans weblogic.jar and all of the classes referenced in its manifest classpath
  - With this option, files in the modules directory are not scanned
  - If needed, you can manually add files to the classpath

Some Standard Best Practices

- Parameterize your script and use the preamble for assigning variables
  - easily assigned and changed

- Before creating something, check to see that it exists

```
try:
    cd('/servers/' + serverID)
    print 'The server ' + serverID + ' already exists'
    exit()
except WLSTException:
    pass
```

Redirecting Error and Debug Output to a File

- To redirect WLST information, error, and debug messages from standard out to a file, enter:

```
redirect(outputFile,[toStdOut])
```

- This command also redirects the output of the dumpStack() and dumpVariables() commands.
- For example, to redirect WLST output to the logs/wlst.log file under the directory from which you started WLST, enter the following command:

```
wls:/mydomain/serverConfig> redirect('./logs/wlst.log')
```

Recording User Interactions

- You can record all your actions in the Administrative Console to a script

Also recording available via the following WLST commands:

- startRecording(*recordFilePath*,[recordAll])
  - recordFilePath – path to file for recorded commands
  - recordAll – true/**false**; specifies capture all user interactions, or just the WLST commands
- stopRecording() – stops the recording and writes the script