Oracle WebLogic Server Application Security

Implementing the Superstition in JDeveloper

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quovera

Believe It or Not

Security is mostly a superstition.
It does not exist in nature,
nor do the children of men
as a whole experience it.
Avoiding danger is no safer
in the long run than outright exposure.
Life is either a daring adventure
or nothing.

—Helen Keller (1880-1968)

Agenda

- Overview
- Setting up ADF Security
- Securing resources

The white paper contains a hands-on practice.

Slides and white paper will be on the RMOUG and Quovera websites

Upcoming
11:15 – Deploying Applications to WebLogic Server

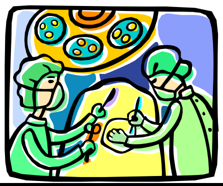
Application Security Objectives

- Ultimate security may just be superstition, however, data must be protected
  - Need to make breaking in as difficult as possible
- Web apps are more accessible to hackers
- Protections needed for
  - Application access
  - Application functions (no SQL injection, cross-site scripting)
  - Data access
  - Data visibility
  - Tracking user activity

Assumes the server and file systems are protected.

Two Primary Operations

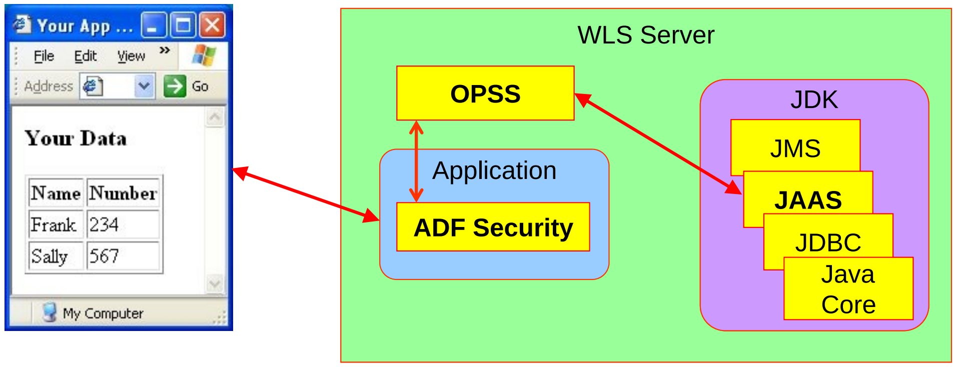
- Authentication
  - Validate that the user is who she/he claims to be
    - Normally done with passwords
    - With extra equipment, could be something else
      - Retinal scan, thumbprint, biometric scanners? DNA?
- Authorization
  - Allow authenticated user access to specific resources
  - Usually done with security roles
    - Like database roles
    - Application components (pages, functions) and data are made available to named roles
    - Users are enrolled in roles
      - User has access to whatever the role is granted



How to Implement the Superstition

- Use recognized, prebuilt, proven, supported security technologies
- Java Authentication and Authorization Services (JAAS)
  - Java API library in the Java SE Development Kit (JDK or J2SDK))
  - Accessible through Oracle Platform Security Services (OPSS) – a service of WebLogic Server
- Oracle ADF Security
  - Built to use OPSS
  - Uses standard ADF declarative techniques
  - Once you turn it on, you need to define access for all pages in the application

Summarizing That



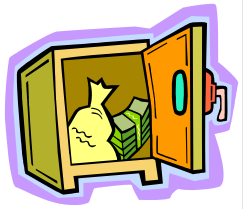
Name	Number
Frank	234
Sally	567

The Security Policy

- A definition of privileges in ADF Security
  - Contained in a *Security Policy Store*
- Create one or more in an application
- Principals
  - One or more roles (groups of users) who are granted access
- Resources
  - Bounded task flow – including all flows under it
  - Web pages that use ADF bindings
  - Entity objects and entity object attributes
- Permissions
  - Privileges such as View, Customize, Grant, Personalize

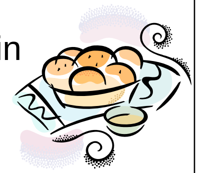
The User Repository

- The storehouse of user and enterprise role information
  - A.k.a., *credentials store* or *identity store*
- OPSS can tap into multiple LDAP repositories
  - LDAP (Lightweight Directory Access Protocol)
    - A communications protocol
    - Internal WebLogic LDAP
    - Oracle Internet Directory (OID)
      - Used for Single Sign-On (SSO)
    - Can read other LDAP providers
      - E.g., Microsoft Active Directory
- Can use other user repositories such as Oracle database accounts
  - Tie in using a *Login modules (JAAS code)*

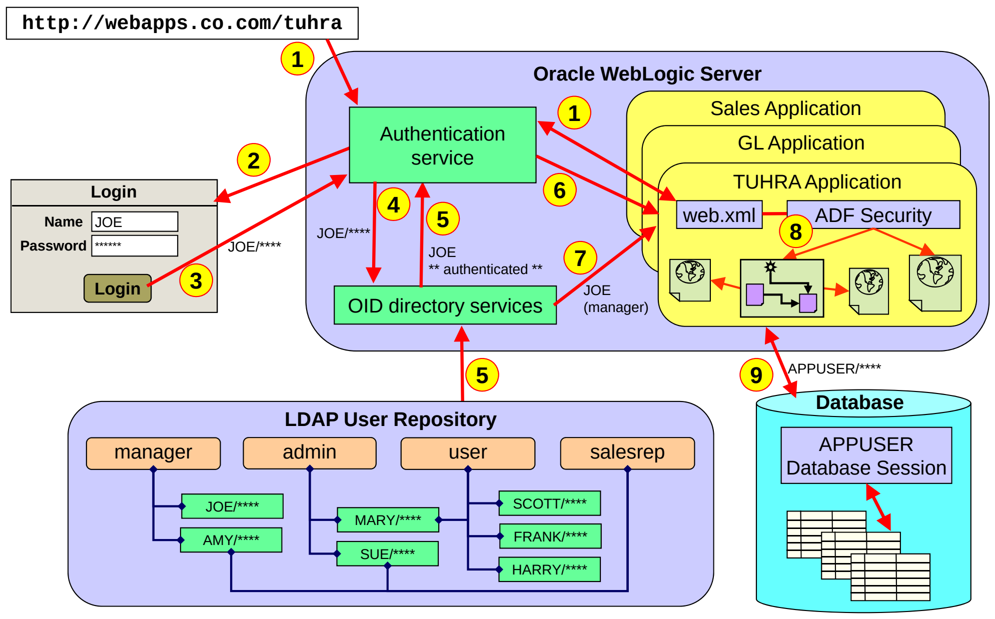


What's a Role?

- Users have a "role" within the enterprise
  - AKA "Enterprise Roles"
  - "Warehouse Clerk", "HR Manager", "Chief Bottlewasher"
  - A single user will usually have multiple roles
  - Totally dependent on the business organization
  - May change over time for a single user
- Applications also have the concept of "role"
  - **Not** the same thing
  - Application roles define functional areas within the application's "responsibilities"
    - "approver", "page manager", "user" etc...

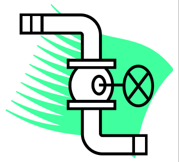


Application Security Flow



Application Security Flow

1. User sends HTTP request including a context root indicating a particular application. The request determines that ADF security is active in the application.
2. The authentication service determines the type of authentication (login page) and presents the login page.
3. The user enters an ID and password and submits the login page.
4. The authentication service requests OID to verify the user and password.
5. OID verifies the password from the LDAP source and indicates pass or fail to the authentication service.
6. The authentication service accesses the application and places the user name into the HTTP session.
7. The application can request the username or group (role, in this example, "manager") to which the user belongs.
8. web.xml activates ADF Security for authorization to specific resources like pages and task flows.
9. The application connects to the database using the application database user account (APPUSER) written into a data source on the application server.



Agenda

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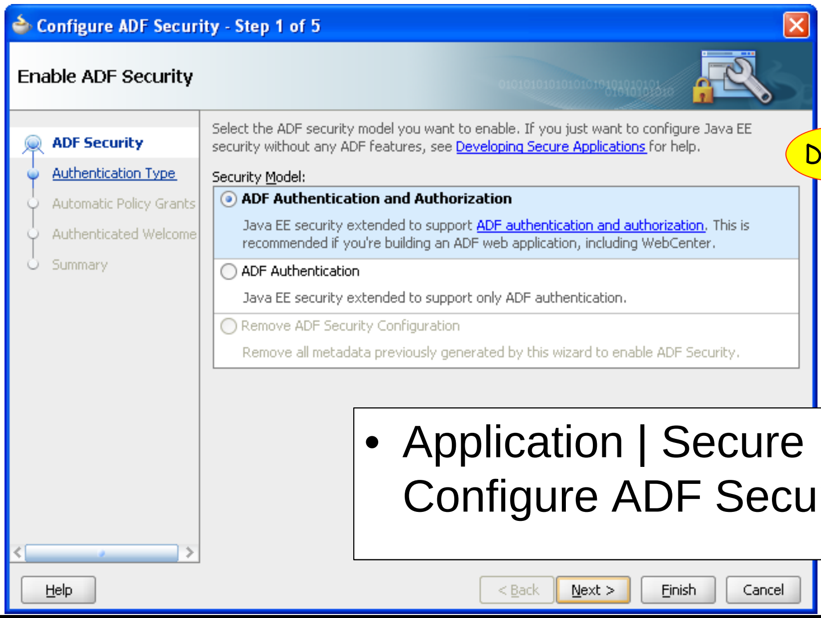
- **Setting up ADF Security**
- Securing resources

Enable ADF Security



Configure ADF Security - Step 1 of 5

Enable ADF Security

Select the ADF security model you want to enable. If you just want to configure Java EE security without any ADF features, see Developing Secure Applications for help.

Security Model:

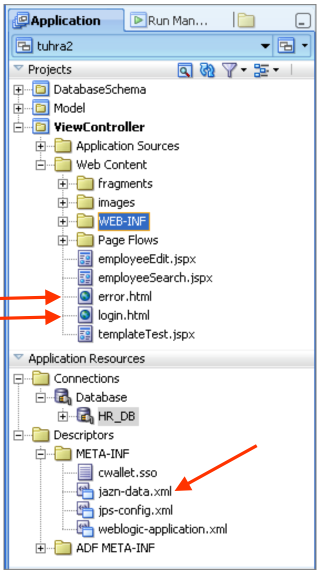
- (●) **ADF Authentication and Authorization**
  Java EE security extended to support ADF authentication and authorization. This is recommended if you're building an ADF web application, including WebCenter.
- ( ) ADF Authentication
  Java EE security extended to support only ADF authentication.
- ( ) Remove ADF Security Configuration
  Remove all metadata previously generated by this wizard to enable ADF Security.

Demo

- Application | Secure | Configure ADF Security

Configure ADF Security Wizard

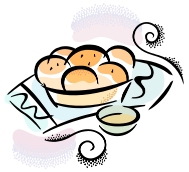
- Form-based authentication
  - Can create custom login and error pages
- No automatic grants
- Redirect upon successful authentication
- Creates
  - login.html
  - error.html
  - jazn-data.xml
- Updates
  - web.xml (auth type and page names)
  - weblogic.xml
    - Look at it for security-role-assignment
  - Maps principals (users) to roles

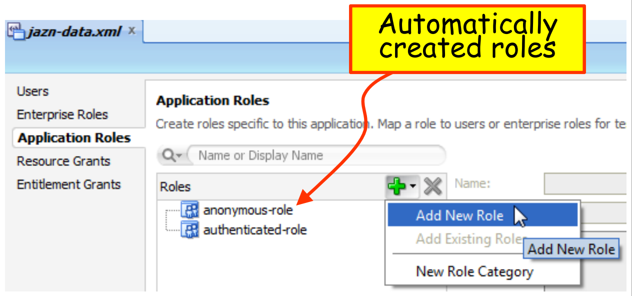


```
Application | Run Man...
tuhra2
Projects
 DatabaseSchema
 Model
 ViewController
   Application Sources
   Web Content
     fragments
     images
     WEB-INF
     Page Flows
     employeeEdit.jspx
     employeeSearch.jspx
     error.html
     login.html
     templateTest.jspx
Application Resources
 Connections
   Database
     HR_DB
 Descriptors
   META-INF
     cwallet.sso
     jazn-data.xml
     jps-config.xml
     weblogic-application.xml
   ADF META-INF
```

Create Application Roles

- Application menu, **Secure | Application Roles**
  - Opens editor for jazn-data.xml
    - In the META-INF directory
- Define application roles
  - Application Roles tab
  - Add New Role (+)
  - Name, display name





jazn-data.xml

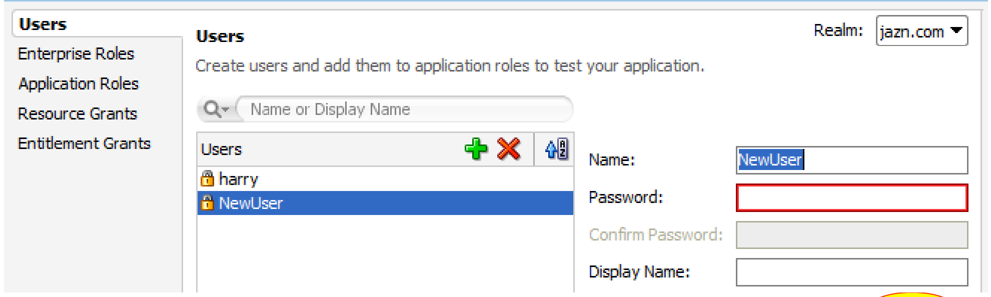
Application Roles

Create roles specific to this application. Map a role to users or enterprise roles for te

Automatically created roles

Define Application Users

- Users tab
  - Define name
  - Password (internal to XML file, not for enterprise security) – 8 chars, include number



Users | Enterprise Roles | Application Roles | Resource Grants | Entitlement Grants

Users

Create users and add them to application roles to test your application.

Realm: jazn.com

Users: harry, NewUser

Name:	NewUser
Password:	
Confirm Password:	
Display Name:	

Demo

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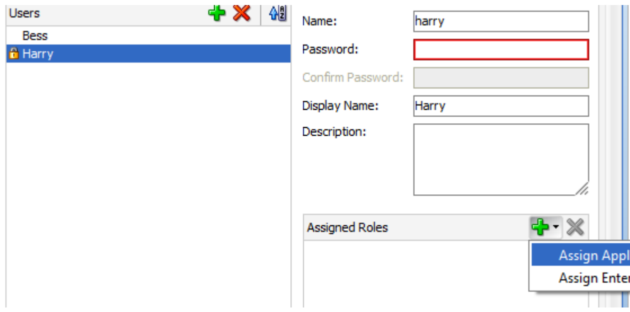
Users in Roles

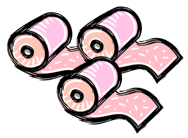
- Assigned Roles area of Users tab



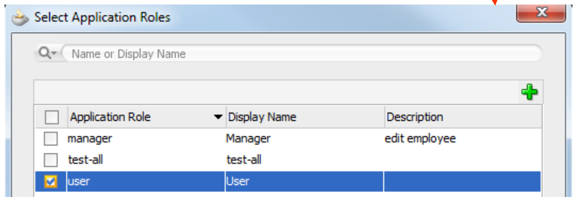
Users: Bess, Harry

Name:	harry
Password:	
Confirm Password:	
Display Name:	Harry
Description:	

Assigned Roles



Demo



Select Application Roles

☐	Application Role	Display Name	Description
☐	manager	Manager	edit employee
☐	test-all	test-all	
✓	user	User	

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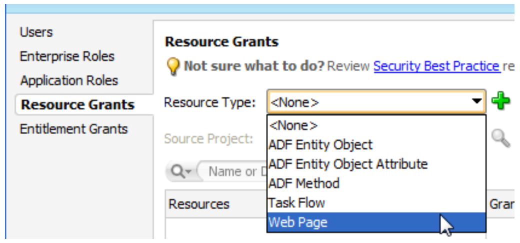
Set Up Grants to Resources

- Resource Grants tab
- Resource Type: Web Page
- Select a page
  - Add (+)
  - Roles (preferred) or users (not as flexible)
- Pages will require authentication



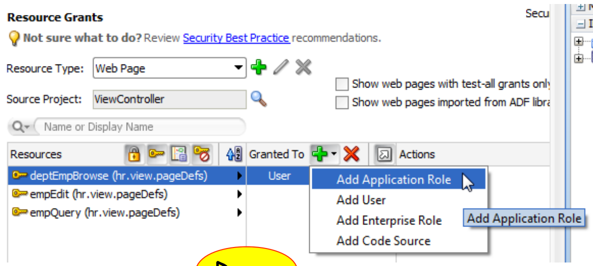
Users | Enterprise Roles | Application Roles | Resource Grants | Entitlement Grants

Resource Grants

Not sure what to do? Review Security Best Practice re

Resource Type: <None>

Source Project:



Resource Grants

Not sure what to do? Review Security Best Practice recommendations.

Resource Type: Web Page

Source Project: ViewController

☐ Show web pages with test-all grants only

☐ Show web pages imported from ADF libra

Resources	Granted To	Actions
deptEmpBrowse (hr.view.pageDefs)	User	
empEdit (hr.view.pageDefs)		
empQuery (hr.view.pageDefs)		

Demo

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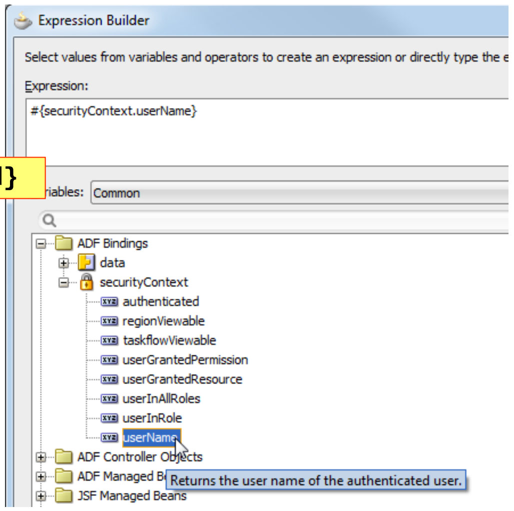
Add User Name Display

- Output Text (Formatted), Expression Builder for *Value* property
  - Display the name
- Set *Rendered*

```
#{securityContext.authenticated}
```

(display if authenticated)



Expression Builder

Select values from variables and operators to create an expression or directly type the e

Expression:

#{securityContext.userName}

riables: Common

Returns the user name of the authenticated user.

Add Login Link

- Link (Go), *Text* property

```
#{securityContext.authenticated ? "Logout" : "Login"}
```

  - Logout if not authenticated, else Login
- – *Destination* property
  - Call the ADF authentication servlet
  - If already authenticated, pass logout = true to log out the user and return to menu.jspx
  - If not authenticated, pass success URL of main.jspx (which requires authentication and will display the login page

```
#{securityContext.authenticated ?
"/adfAuthentication?logout=true&end_url=/faces/menu.jspx" :
"/adfAuthentication?success_url=/faces/main.jspx"}
```

Hiding Items

- Suppose Salary is sensitive data and only viewable by managers
  - *Set the rendered* property on Salary field

```
#{securityContext.userInRole['manager']}
```

- Hiding a link or button based on the availability of a resource
  - e.g, edit menu item only viewable to those allowed to edit

```
#{securityContext.regionViewable['view.pageDefs.editPageDef']}
```

```
#{securityContext.taskFlowViewable[
                    '/WEB-INF/userEdit.xml#userEdit']}
```

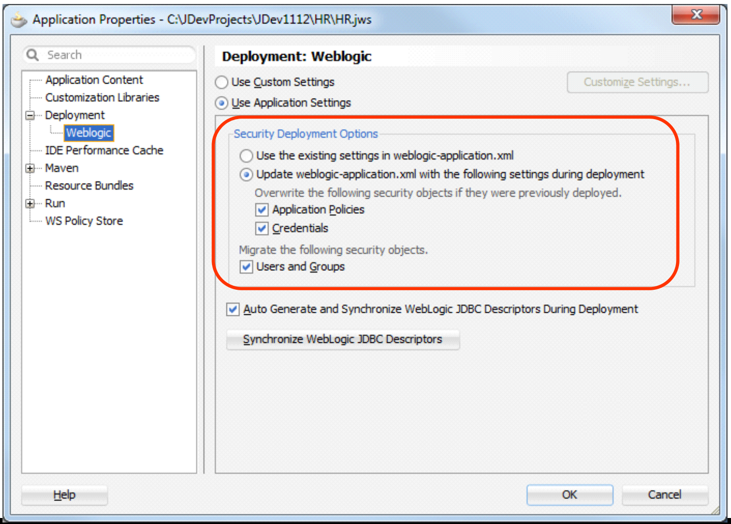
You can Ask the Same Questions in Code..

- Create the relevant permission class instance
- Pass it to the security context for evaluation

```
String tfID = ”/WEB-INF/userEdit.xml#userEdit”
TaskFlowPermission permission = new
TaskFlowPermission(
     tfID,TaskFlowPermission.VIEW_ACTION);
SecurityContext sctx  = ADFContext.getCurrent().
     getSecurityContext();
 if sctx.hasPermission(permission) {
    …
 }
```

Application Deployment Settings

- Deploying the application automatically deploys users and groups



Application Properties - C:\JDevProjects\JDev1112\HR\HR.jws

Deployment: Weblogic

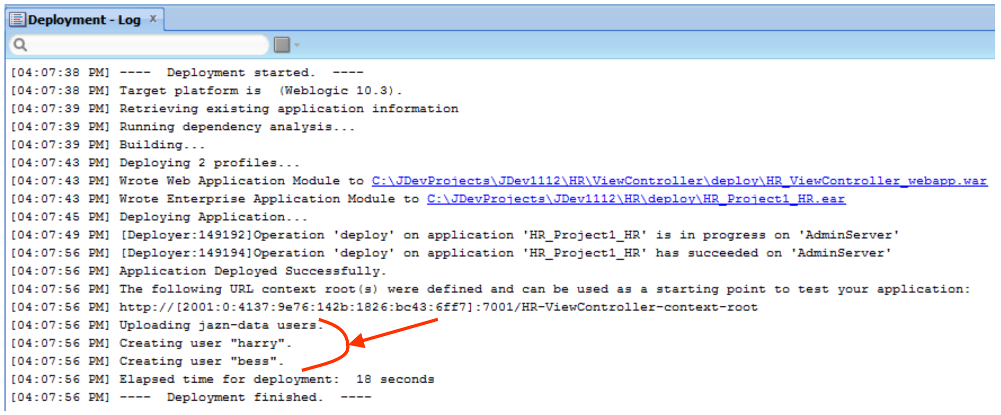
( ) Use Custom Settings
(●) Use Application Settings

Security Deployment Options
( ) Use the existing settings in weblogic-application.xml
(●) Update weblogic-application.xml with the following settings during deployment
Overwrite the following security objects if they were previously deployed.
[✓] Application Policies
[✓] Credentials
Migrate the following security objects.
[✓] Users and Groups

[✓] Auto Generate and Synchronize WebLogic JDBC Descriptors During Deployment

Deploying Security

- Deploying the application automatically deploys users and groups



Deployment - Log

```
[04:07:38 PM] ----  Deployment started.  ----
[04:07:38 PM] Target platform is  (Weblogic 10.3).
[04:07:39 PM] Retrieving existing application information
[04:07:39 PM] Running dependency analysis...
[04:07:39 PM] Building...
[04:07:43 PM] Deploying 2 profiles...
[04:07:43 PM] Wrote Web Application Module to C:\JDevProjects\JDev1112\HR\ViewController\deploy\HR_ViewController_webapp.war
[04:07:43 PM] Wrote Enterprise Application Module to C:\JDevProjects\JDev1112\HR\deploy\HR_Project1_HR.ear
[04:07:45 PM] Deploying Application...
[04:07:49 PM] [Deployer:149192]Operation 'deploy' on application 'HR_Project1_HR' is in progress on 'AdminServer'
[04:07:56 PM] [Deployer:149194]Operation 'deploy' on application 'HR_Project1_HR' has succeeded on 'AdminServer'
[04:07:56 PM] Application Deployed Successfully.
[04:07:56 PM] The following URL context root(s) were defined and can be used as a starting point to test your application:
[04:07:56 PM] http://[2001:0:4137:9e76:142b:1826:bc43:6ff7]:7001/HR-ViewController-context-root
[04:07:56 PM] Uploading jazn-data users.
[04:07:56 PM] Creating user "harry".
[04:07:56 PM] Creating user "bess".
[04:07:56 PM] Elapsed time for deployment:  18 seconds
[04:07:56 PM] ----  Deployment finished.  ----
```

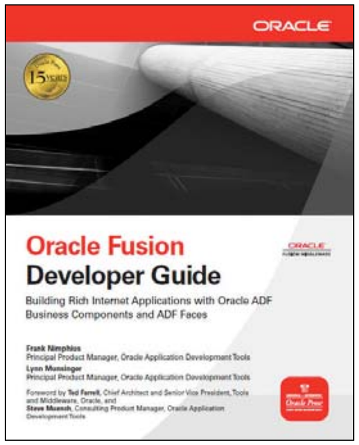
- For an LDAP server, configure the "WLS authentication provider"

Deployment Effects

- Permissions (defined in jazn-data) are deployed to and merged with the permission store in WLS
  - Permission jazn-data appears in the EAR that you create with OJDeploy
- For the embedded WLS running in development mode
  - JDeveloper will create the users in WLS that you've defined in the IDE.
  - JDeveloper, not OJDeploy, does this by calling the WLS MBeans to create the new users on the fly
- Users defined in jazn-data do not migrate into external LDAP repositories

Other Resources

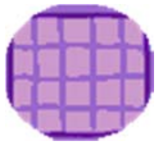
- Hands-on practice in the white paper
- *Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework 11g Release 1 (11.1.2)*
  - PDF at OTN, online in JDev
  - Chapter 29
- *Oracle Fusion Middleware Security Guide 11g Release 1*
  - PDF at OTN
- *Oracle Fusion Developer Guide*
  - Nimphius and Munsinger, McGraw-Hill Professional, Oracle Press (2010)
  - Chapter 21
- OTN Tutorial


ORACLE
15 YEARS
Oracle Fusion
Developer Guide
Building Rich Internet Applications with Oracle ADF Business Components and ADF Faces
Frank Nimphius
Principal Product Manager, Oracle Application Development Tools
Lynn Munsinger
Principal Product Manager, Oracle Application Development Tools
Foreword by Ted Farrell, Chief Architect and Senior Vice President, Tools and Middleware, Oracle, and
Steve Muench, Consulting Product Manager, Oracle Application Development Tools
Oracle Press

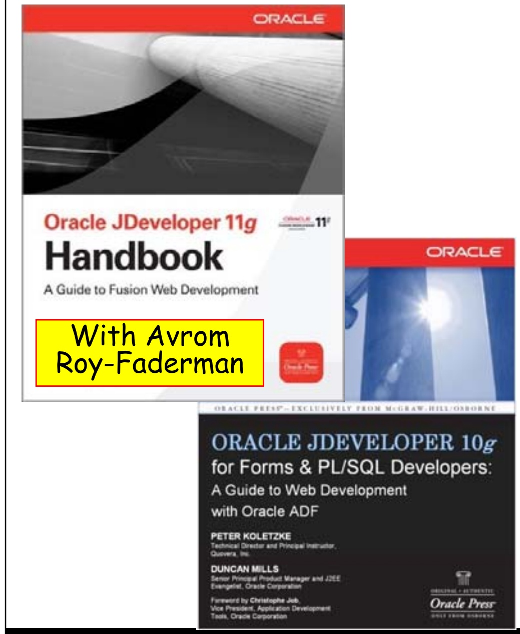
http://download.oracle.com/docs/cd/E18941_01/tutorials/jdtut_11r2_29/jdtut_11r2_29.html

Summary

- You need to design and test application security
- OPSS offers easy access to standard JAAS security features
- ADF Security provides declarative definition of security policies for task flows and pages
- Binding expressions on the page can hide or disable items
- Give the hands-on practice a spin



The Books



The Coauthors

- Peter Koletzke
  - Six other Oracle Press books about Oracle tools
  - www.quovera.com
- Duncan Mills
  - Widely published on OTN, ODTUG, JDJ etc.
  - blogs.oracle.com/groundside/www.oracle.com
- Book examples
  - tuhra2.java.net