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About This Guide

This document explains how to incorporate various security management features of NetIQ Access Manager with your proprietary applications. Unlike many software development kits (SDKs) that rely on application programming interfaces to expose application functionality, this component primarily leverages how Access Manager extends existing Liberty Alliance, OASIS, SAML, and other specifications in defining and exchanging user identities.

This document will be updated as new functionality is released for developers to enhance the capabilities of Access Manager with your own applications and Web services.

This document is divided into the following sections:

- Chapter 1, “Getting Started,” on page 7
- Chapter 2, “Identity Server Authentication API,” on page 9
- Chapter 3, “LDAP Server Plug-In,” on page 29
- Chapter 4, “The Policy Extension API,” on page 37

Audience

The audience for this documentation includes advanced network security software engineers and experienced network administrators who understand the Liberty Alliance, Java* development, and secure networking issues to enforce the security requirements the Liberty Alliance.

Specifically, you should have advanced understanding of Internet protocols such as:

- Extensible Markup Language (XML)
- Simple Object Access Protocol (SOAP)
- Security Assertion Markup Language (SAML)
- Public Key Infrastructure (PKI) digital signature concepts and Internet security
- Secure Socket Layer/Transport Layer Security (SSL/TSL)
- Hypertext Transfer Protocol (HTTP and HTTPS)
- Uniform Resource Identifiers (URIs)
- Domain Name System (DNS)
- Web Services Description Language (WSDL)

User Comments

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation.

Additional Documentation

- NetIQ Access Manager Installation Guide
• NetIQ Access Manager Setup Guide
• NetIQ Access Manager Administration Guide

Additional Information

Use the following sources to obtain more information on how to use this SDK:

• Post a message and view responses on the Access Manager Developer Support Forum (http://forums.novell.com/netiq/netiq-product-discussion-forums/access-manager/)
• Use a news feed and reader to access the same forum: news://forums.novell.com/novell.devsup.accessmgr
NetIQ Access Manager provides a component-based framework for building secure federated identity network applications based on Liberty Alliance project standards. This framework is designed to help developers make a rapid transition into Liberty’s architecture.

The Liberty components enable the convenience of single sign-on and secure business-to-employee, business-to-customer, and business-to-business relationships across a variety of applications within a trusted Web services model. All components are standards-based and designed for maximum interoperability.

This section explains how to get started with the Access Manager SDK and contains the following topics:

- Section 1.1, “Development Overview,” on page 7
- Section 1.2, “Selecting an Integrated Development Environment,” on page 8

1.1 Development Overview

This SDK describes how to design a flexible and expandable access management system to enable your applications to interact with the identity management capabilities of Access Manager, including federation, provisioning, and the secure delivery of identity information (user name and password, and X.509 certificates) to client-based applications.

The SDK is designed for those who want to develop new applications or integrate existing applications with the standards-based security architecture of Access Manager. It allows NetIQ partners and third-party developers to do the following:

- Leverage the identity management and policy capabilities of the product.
- Provide access to various product features, including:
  - Liberty-based federated identity
  - Secure credential exchange
  - User provisioning services
  - Authentication and authorization methods and policies
  - SAML assertion generation and processing

NOTE: To coordinate the development of Liberty-enabled access management applications within the NetIQ industry framework, contact namsdk@novell.com.

1.1.1 SDK Components

The Access Manager developer components are included in the Novell Access Manager Developer Kit (http://www.novell.com/developer/ndk/novell_access_manager_developer_tools_and_examples.html). However, the complete Access
Manager package, including the install, is not included in the NDK. For complete current product information, see the NetIQ Access Manager Product Site (https://www.netiq.com/products/access-manager/).

The SDK does not include the JAR files required from the product to compile your extension. You need access to an Access Manager installation to obtain these files. For an evaluation version, see Novell Downloads (http://download.novell.com/index.jsp) and search for Access Manager.

### 1.1.2 Additional Information

For more information about Access Manager and other related NetIQ security products, see the following links:

- [NetIQ Access Manager Administration Console Guide](https://www.netiq.com/documentation/novellaccessmanager32/adminconsolehelp/data/bookinfo.html)
- [Identity Server Guide](https://www.netiq.com/documentation/novellaccessmanager32/identityserverhelp/data/bookinfo.html)

### 1.2 Selecting an Integrated Development Environment

The Java applications can be developed on a number of open source IDEs such as Eclipse® and NetBeans®.
2 Identity Server Authentication API

This section documents how to create a custom authentication class for the Identity Server. The API presented here allows developers to leverage their own authentication mechanisms within the Access Manager architecture. The following topics are covered:

- Section 2.1, “Prerequisites,” on page 9
- Section 2.2, “Understanding the Authentication Class,” on page 9
- Section 2.3, “Creating an Authentication Class,” on page 11
- Section 2.4, “Understanding the Authentication Class Example,” on page 21
- Section 2.5, “Localizing the Prompts in Your Authentication Class,” on page 24
- Section 2.6, “Deploying Your Authentication Class,” on page 26

2.1 Prerequisites

- Access Manager 3.2.
- Your development environment requires the same installation as outlined in the “NetIQ Access Manager Installation Requirements” (http://www.novell.com/documentation/novellaccessmanager32/installation/data/b1rreuv.html).
- Copy the nidp.jar and NAMCommon.jar files in the following directory of your Identity Server to your development project:
  - On Linux: /opt/novell/nam/idp/webapps/nidp/WEB-INF/lib
  - On Windows: C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib

2.2 Understanding the Authentication Class

Before developing an authentication class, review the following concepts:

- Section 2.2.1, “Authentication Class Components,” on page 9
- Section 2.2.2, “How the Authentication Class Operates,” on page 10

2.2.1 Authentication Class Components

The Identity Server is the central authentication and identity access point for all services performed by Access Manager. The Identity Server supports numerous ways for users to authenticate. These include name/password, RADIUS token-based authentication, and X.509 digital certificates.

For more detailed information about the Identity Server and its relation to other Access Manager components, see “Identity Servers” (http://www.novell.com/documentation/novellaccessmanager32/installation/data/b6jju7o.html#b6jxcx) in the NetIQ Access Manager Installation Guide.
The configuration and interaction of the following entities defines how authentication takes place within Identity Server:

- **User Stores:** The LDAP directory that stores the user credentials. Access Manager can be configured to use the following directories: eDirectory™, Active Directory®, or Sun One®. Users set up their user stores when creating the Identity Server configuration.

- **Authentication Classes:** The code (a Java class) that implements a particular authentication type (name/password, RADIUS, and X.509) or means of obtaining credentials. This is what you create with this API.

- **Authentication Methods:** Pairs an authentication class with one or more user stores, primarily to identify authenticated users. Authentication methods also can be designed to identify entities other than end users.

- **Authentication Contracts:** The basic unit of authentication within Identity Server. Contracts are identified by a unique uniform resource identifier (URI) that can be used by Access Gateways and agents to protect resources. Contracts are comprised of one or more authentication methods used to uniquely identify a user.

**Figure 2-1** illustrates the components of a contract:

![Local Authentication Components](image)

<table>
<thead>
<tr>
<th>User Stores</th>
<th>Class</th>
<th>Method</th>
<th>Contract</th>
</tr>
</thead>
</table>

### 2.2.2 How the Authentication Class Operates

**Figure 2-2** illustrates an example of how an authentication class is used to authenticate to an Identity Server. It uses a single user store located on an LDAP server to verify name and password credentials.

**Figure 2-2**  *How the Authentication Class Handles a User Request.*

1. A user initializes an authentication request from a browser.
2. The request causes the default authentication class to execute. This class defines what credentials are required for authentication, and it returns a response prompting the user for the required credentials (that is, username, password, x509 certificate, etc.). The user enters the credentials.
3. The class obtains the credentials, then passes them to the user store for verification and validation.
4. If credentials are valid, the user store returns the user’s DN (or other information specified by the method) and allows user access. If the information is not valid, access is denied.
The authentication API also enables you to implement more complex authentication using X.509 certificates, data generated by token devices, biometric data, or other data you specify. In such instances, you must specify the outside resources that contain the credential stores that are configured to validate the required user credentials.

### 2.3 Creating an Authentication Class

The Identity Server architecture provides a programming interface that allows you to create a custom authentication class that can be plugged into the Access Manager system. Custom authentication classes can define additional ways of obtaining and validating end-user credentials. You use the Access Manager Administration Console to identify your custom classes and specify any needed initialization properties. Custom classes must be configured to be in the class path of the Identity Server.

The following sections explain project requirements and the methods available for creating a custom class:

- Section 2.3.1, “Project Requirements,” on page 11
- Section 2.3.2, “The doAuthenticate Method,” on page 11
- Section 2.3.3, “Authentication Methods,” on page 13
- Section 2.3.4, “Class Property Methods,” on page 14
- Section 2.3.5, “Status Methods,” on page 18
- Section 2.3.6, “User Information Methods,” on page 19
- Section 2.3.7, “Other Methods,” on page 20

For the Javadoc associated with these methods, see LocalAuthenticationClass (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html)

#### 2.3.1 Project Requirements

The project used to create the custom class must include the `nidp.jar` file shipped with Access Manager. This JAR file is located here:

- **Linux:** `/opt/novell/nam/idp/webapps/nidp/WEB-INF/lib`
- **Windows:** `C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib`

#### 2.3.2 The doAuthenticate Method

A customized authentication class must extend the abstract class `com.novell.nidp.authentication.local.LocalAuthenticationClass`, which is found in `nidp.jar`. The base class contains a single required constructor. Your custom class must implement one of two methods, either `doAuthenticate()`, which is preferred, or `authenticate()`, which was used in previous releases of this SDK.

The `doAuthenticate()` method is new in Access Manager 3.0 SP3. Previous releases used the `authenticate()` method. The older method is still supported, but new classes created for SP3 and later should use the `doAuthenticate()` method because it performs additional Novell SecretStore® checks. SecretStore now supports a security flag that locks the SecretStore when secrets are modified. The `doAuthenticate()` method performs checks to determine the state of the SecretStore. If it is locked, it prompts the user to supply the passphrase that can be used to unlock the SecretStore. If you use the
older authenticate() method and the SecretStore is locked, no indication of this state is returned. The SecretStore remains locked, and Access Manager cannot retrieve the secrets for policies or applications that require them.

The Identity Server calls the doAuthenticate() method during its interaction with the class. Multiple calls to authenticate often are made to collect the necessary authentication credentials. The method returns a value indicating any of the following authentication states:

<table>
<thead>
<tr>
<th>Constant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HANDLED_REQUEST</td>
<td>The request has been handled and a response provided. Further processing or information is needed to complete authentication. Typically, this value is returned when a page is returned to query for credentials.</td>
</tr>
<tr>
<td>SHOW_JSP</td>
<td>Further information is needed to complete authentication. Typically, this value is returned when a page is returned to query for credentials.</td>
</tr>
<tr>
<td>NOT_AUTHENTICATED</td>
<td>The authentication failed.</td>
</tr>
<tr>
<td>AUTHENTICATED</td>
<td>The authentication succeeded in identifying a single NIDPPrincipal object (user).</td>
</tr>
<tr>
<td>CANCEL</td>
<td>The authentication process was canceled. This typically occurs only during authentication after a request from a service provider.</td>
</tr>
<tr>
<td>PWD_EXPIRING</td>
<td>Although authentication is successful, a user’s password is about to expire. This condition causes a redirection to the expired password servlet if one is defined on the authentication contract.</td>
</tr>
<tr>
<td>PWD_EXPIRED</td>
<td>Authentication is unsuccessful, because the user’s password is expired. This condition causes a redirection to the expired password servlet if one is defined on the authentication contract.</td>
</tr>
</tbody>
</table>

When the doAuthenticate() method succeeds, it needs to return AUTHENTICATED. It can succeed only when it obtains a single NIDPPrincipal object from a user store using the credentials obtained to verify the principal. After credentials are obtained, each user store is searched to locate a user identified by the credentials. Each user store is searched until one of the following conditions is met:

- **Successful authentication**: Indicates that a single user/object is located.
- **Unsuccessful authentication with an error**: Indicates that more than one user/object is located.
### 2.3.3 Authentication Methods

When implementing the `doAuthenticate` method(), you can use the following methods to retrieve and manage authentication credentials:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
</table>
| `authenticateWithPassword()` | Takes a user ID and password as its arguments. The method succeeds if a user with the given ID and password is located.  
See [authenticateWithPassword](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#authenticateWithPassword(java.lang.String, java.lang.String)). |
| `authenticateWithQuery()`   | Takes a string in the form of an LDAP query and a password as its arguments. It succeeds if the query result locates a single user with the associated password.  
See [authenticateWithQuery](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#authenticateWithQuery(java.lang.String, java.lang.String)). |
| `findPrincipals()`         | Locates the users in a directory that match the specified user ID. The method does not do any password verification. It returns an array of NIDPPrincipal objects that result from the search.  
See [findPrincipals](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#findPrincipals(java.lang.String)). |
| `findPrincipalsByQuery()`  | Locates the users in a directory that match the specified LDAP query. The method does not do any password verification. It returns an array of NIDPPrincipal objects that match the query.  
See [findPrincipalsByQuery](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#findPrincipalsByQuery(java.lang.String)). |
| `getCredentials()`         | Gets the list of credentials used to authenticate the user or principal. The Identity Server uses this method to obtain the credentials verified by an authentication class for possible later use with an Identity Injection policy. An authentication class does not typically call this method.  
See [getCredentials](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getCredentials()). |
| `addCredential()`          | Adds a credential used for authentication to a user or principal. This method is called by a class so that the Identity Server can call the `getCredentials()` method.  
See [addCredential](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#addCredential(WSCQToken, XMLBase)) |
| `addLDAPCredentials()`     | Adds an LDAP credential, other than the password, to a user or principal.  
See [addLDAPCredentials](http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#addLDAPCredentials()) |
2.3.4 Class Property Methods

Typically, classes have properties assigned to them. The installed Identity Server authentication classes have associated properties. Because these classes and their properties are known, the Administration Console displays configuration pages for their required properties. For information about these properties, see “Creating Authentication Classes” (https://www.netiq.com/documentation/novellaccessmanager32/identityserverhelp/data/authclasseslist.html) in the NetIQ Access Manager 3.2 Identity Server Guide.

When you deploy your class, the Administration Console has a generic page that allows the administrator to configure property key and value pairs. As you are creating your class, you need to create a key name and value pair for each configuration item that you want input from the administrator. For example, if you want to allow the administrator to use a different JSP page for the login form, you can create a key name of JSP with an expected value of filename. You would use the `getProperty()` method to obtain the value of the JSP key name. If the method returns null, you would have your code use your default JSP page. You need to document any key names that you create and the type of value that it requires, and make this information available to the administrator.

The class property methods return all values as strings, but you can manipulate the string value as required by your code. For example, if your key name requires a number and the administrator configures the key name with a letter value, you need to decide how to handle such an error (continue and use a default value or throw an exception). As a minimum, the error should be logged, so that the administrator can discover the cause of the configuration problem.

The following methods are available for retrieving information about configuration properties.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>clearCredentials()</code></td>
<td>Clears the credentials of the user or principal.</td>
</tr>
<tr>
<td></td>
<td>See clearCredentials (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#clearCredentials()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#clearCredentials()</a>)</td>
</tr>
<tr>
<td><code>getProperty()</code></td>
<td>Obtains specific properties needed by an authentication class. Property</td>
</tr>
<tr>
<td></td>
<td>values are specified when configuring the authentication class in the</td>
</tr>
<tr>
<td></td>
<td>Administration Console.</td>
</tr>
<tr>
<td></td>
<td>See getProperty (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getProperty(java.lang.String)">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getProperty(java.lang.String)</a>).</td>
</tr>
<tr>
<td><code>getBooleanProperty()</code></td>
<td>Returns a Boolean value for the specified property and sets a default</td>
</tr>
<tr>
<td></td>
<td>value if value cannot be found.</td>
</tr>
<tr>
<td></td>
<td>See getBooleanProperty (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getBooleanProperty(java.lang.String">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getBooleanProperty(java.lang.String</a>, boolean))</td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>getType()</code></td>
<td>Identifies one of the authentication types known to the Identity Server. The value returned by this method is used primarily when a service provider initiates an authentication request by asking for a specific authentication type. When such a request is made, a check of all executed contracts is made. If a contract has executed a method by using a class that defines the particular type, the authentication succeeds. See “Supported Authentication Class Types” on page 17 for a list of supported types. See <code>getType</code> (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getType()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getType()</a>).</td>
</tr>
<tr>
<td><code>getProvisionURL()</code></td>
<td>Gets the URL to call to provision a user and returns the URL to redirect to for user provisioning, or Null if it is not available. See <code>getProvisionURL</code> (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getProvisionURL()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getProvisionURL()</a>).</td>
</tr>
<tr>
<td><code>getReturnURL()</code></td>
<td>Returns the URL that any user interactions should post data back to, or Null if it is not available. See <code>getReturnUrl</code> (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getReturnURL()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getReturnURL()</a>).</td>
</tr>
<tr>
<td><code>mustPersist()</code></td>
<td>Indicates whether the class must persist for interaction with the user during the entire authentication session. If this is the case, returns True. For more information about persistence, see “Class Persistence” on page 17. See <code>mustPersist</code> (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#mustPersist()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#mustPersist()</a>).</td>
</tr>
<tr>
<td><code>isFirstInstance()</code></td>
<td>Determines if this authentication class instance is the first instance after the system was started or was reconfigured. Returns True if it is the first instance. See <code>isFirstInstance</code> (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isFirstInstance()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isFirstInstance()</a>)</td>
</tr>
<tr>
<td><code>isCancelAppropriate()</code></td>
<td>Determines if the option to cancel an authentication is appropriate for this instance. See <code>isCancelAppropriate</code> (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isCancelAppropriate()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isCancelAppropriate()</a>).</td>
</tr>
</tbody>
</table>
isDefinesUser() Determines if the authentication class instance needs to identify a user. If so, returns True.

For more information, see the Identifies User option in “Configuring Authentication Methods” (https://www.netiq.com/documentation/novellaccessmanager32/identityserverhelp/data/configureauthmethod.html) in the NetIQ Access Manager 3.2 Identity Server Guide.

See also isDefinesUser (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isDefinesUser()).

isUserIdentification() Determines if this authentication class instance is the result of an assertion being returned to an unauthenticated session. The request for authentication is the result of an assertion from an identity provider, and it is necessary to identify the user for the purpose of completing the federation process.

See isUserIdentification (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isUserIdentification()).

isFirstCallAfterPrevMethod() Defines the sequence of the authentication process after a method is called and determines if this authentication class instance is the result of an assertion being returned to an unauthenticated session.

This is useful to determine if an authentication class begins execution immediately after the successful completion of another class. This enables a class to know if credentials were actually used by the previous class.

See isFirstCallAfterPrevMethod (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isFirstCallAfterPrevMethod()).

isPendingAuthnRequest() Determines whether there is a pending authentication request from a Service Provider. Returns True if there is a pending request, otherwise, returns False.

See isPendingAuthnRequest (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#isPendingAuthnRequest()).

getAuthnRequest() Gets the request that might have caused this authentication class to be invoked.

See getAuthnRequest (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getAuthnRequest())
Supported Authentication Class Types

When you create an authentication class, you must specify an authentication type. An authentication type is required, because some service providers request contracts, not by URI, but by authentication type. The Identity Server can reply to such a request with all the contracts that fit the requested authentication type.

The Identity Server supports the following types of authentication classes:

<table>
<thead>
<tr>
<th>Constant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AuthnConstants.BASIC</td>
<td>Specifies a basic authentication over HTTP. It uses the login page of the browser to prompt the user for a name and a password.</td>
</tr>
<tr>
<td>AuthnConstants.PASSWORD</td>
<td>Specifies a form-based authentication using a name and password over HTTP.</td>
</tr>
<tr>
<td>AuthnConstants.PROTECTED_BASIC</td>
<td>Specifies a basic authentication over HTTPS. It uses the login page of the browser to prompt the user for a name and a password.</td>
</tr>
<tr>
<td>AuthnConstants.PROTECTED_PASSWORD</td>
<td>Specifies a form-based authentication using a name and password over HTTPS.</td>
</tr>
<tr>
<td>AuthnConstants.X509</td>
<td>Specifies authentication using an X.509 certificate.</td>
</tr>
<tr>
<td>AuthnConstants.TOKEN</td>
<td>Specifies a token-based authentication type.</td>
</tr>
<tr>
<td>AuthnConstants.SMARTCARD</td>
<td>Specifies a smart-card-based authentication method.</td>
</tr>
<tr>
<td>AuthnConstants.SMARTCARDPKI</td>
<td>Specifies a multiple authentication method using a smart card.</td>
</tr>
<tr>
<td>AuthnConstants.OTHER</td>
<td>Default. Used for all other types not defined above.</td>
</tr>
</tbody>
</table>

Class Persistence

Persistence of a class is session based. A session is created when a user is prompted to provide credentials for a contract. Each method of a contract gets executed in the order defined in the contract. When a method executes, it creates an instance of the class. The class can persist between requests for credentials if necessary. If keeping state is not required by the class, then it does not need to persist. By default, classes persist. If this is not the desired behavior, use the mustPersist() method to return False.

If the class is configured to persist, the instance of the class persists as long as the doAuthenticate() or authenticate() method of the class returns HANDLED_REQUEST. When this method returns any other value, the instance of the class is removed. For a list of possible return values, see Section 2.3.2, “The doAuthenticate Method,” on page 11.
### 2.3.5 Status Methods

The following methods allow you to set status information about the authentication instance, to retrieve status information about the instance, to set and get error messages, and to log messages.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>setFailure()</td>
<td>Sets a failure state for the current authentication instance.</td>
<td>setFailure (<a href="http://www.novell.com/documentation/developer/nacm32/">http://www.novell.com/documentation/developer/nacm32/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LocalAuthenticationClass.html#setFailure())</td>
</tr>
<tr>
<td>isFailure()</td>
<td>Indicates whether or not the authentication failed. Returns True if</td>
<td>isFailure (<a href="http://www.novell.com/documentation/developer/nacm32/">http://www.novell.com/documentation/developer/nacm32/</a></td>
</tr>
<tr>
<td></td>
<td>authentication failed, otherwise, returns False.</td>
<td>nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LocalAuthenticationClass.html#isFailure())</td>
</tr>
<tr>
<td>setUserErrorMsg()</td>
<td>Sets the error message to be displayed to an end user.</td>
<td>setUserErrorMsg (<a href="http://www.novell.com/documentation/developer/">http://www.novell.com/documentation/developer/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>nacm32/nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LocalAuthenticationClass.html#setUserErrorMsg(java.lang.String))</td>
</tr>
<tr>
<td>getUserErrorMsg()</td>
<td>Gets the error message that will be displayed to the end user.</td>
<td>getUserErrorMsg (<a href="http://www.novell.com/documentation/developer/">http://www.novell.com/documentation/developer/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>nacm32/nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LocalAuthenticationClass.html#getUserErrorMsg())</td>
</tr>
<tr>
<td>getLogMsg()</td>
<td>Gets the message for the associated error ID. This method is used</td>
<td>getLogMsg (<a href="http://www.novell.com/documentation/developer/">http://www.novell.com/documentation/developer/</a></td>
</tr>
<tr>
<td></td>
<td>primarily by the Identity Server to obtain the credentials verified by an</td>
<td>nacm32/nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td>authentication class.</td>
<td>LocalAuthenticationClass.html#getLogMsg())</td>
</tr>
<tr>
<td>setErrorMsg()</td>
<td>Sets the error message to be seen by the end user, as well as the error</td>
<td>setErrorMsg (<a href="http://www.novell.com/documentation/developer/">http://www.novell.com/documentation/developer/</a></td>
</tr>
<tr>
<td></td>
<td>message to be put into the log file.</td>
<td>nacm32/nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LocalAuthenticationClass.html#setErrorMsg(java.lang.String,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>java.lang.String))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See “Authentication Error Messages” on page 19.</td>
</tr>
<tr>
<td>setErrorMsg()</td>
<td>Sets the error message to be seen by the end user, as well as the error</td>
<td>setErrorMsg (<a href="http://www.novell.com/documentation/developer/">http://www.novell.com/documentation/developer/</a></td>
</tr>
<tr>
<td></td>
<td>message with a parameter to be put into the log file.</td>
<td>nacm32/nacm_enu/api/com/novell/nidp/authentication/local/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LocalAuthenticationClass.html#setErrorMsg(java.lang.String,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>java.lang.String, java.lang.String))</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See “Authentication Error Messages” on page 19.</td>
</tr>
</tbody>
</table>
Authentication Error Messages

The following error messages have been defined for the LocalAuthenticationClass and are returned:

<table>
<thead>
<tr>
<th>Value</th>
<th>Error Message Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG_INCORRECT_PASSWORD</td>
<td>The password entered does not match any of those authorized in the specified user stores.</td>
</tr>
<tr>
<td>LOG_INTRUDER_DETECTION</td>
<td>(eDirectory only) The user account is locked because of intruder detection.</td>
</tr>
<tr>
<td>LOG_RESTRICTED_ACCOUNT</td>
<td>(eDirectory only) This account has restricted access and the user is attempting to access it during a time period when the account has been configured to deny access.</td>
</tr>
<tr>
<td>LOG_DISABLED_ACCOUNT</td>
<td>The account requested is disabled.</td>
</tr>
<tr>
<td>LOG_BAD_CONNECTION</td>
<td>The authentication channel is unable to communicate the user request.</td>
</tr>
</tbody>
</table>

2.3.6 User Information Methods

The following methods allow you to set the identity of who has been authenticated and to set values for any associated attributes. If the instance is persistent, you can retrieve this same information. User authorities are the LDAP servers that the Identity Server has been configured to use for verifying authentication credentials. The principal user authority is the LDAP server that was used to verify the user’s credentials.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>getPrincipal()</td>
<td>Gets the principal authenticated by this class. This value is Null if the authentication class is set to not define a user or if the authentication fails. This method is used primarily by the Identity Server to obtain the credentials verified by an authentication class.</td>
</tr>
<tr>
<td></td>
<td>See getPrincipal (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getPrincipal()">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getPrincipal()</a>)</td>
</tr>
<tr>
<td>getPrincipalAttributes()</td>
<td>Gets the attributes for the principal that has been authenticated.</td>
</tr>
<tr>
<td></td>
<td>See getPrincipalAttributes (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getPrincipalAttributes%28java.lang.String">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getPrincipalAttributes%28java.lang.String</a> %5b%5d%29)</td>
</tr>
<tr>
<td>getPrincipalUserAuthority()</td>
<td>Gets the user authority for the identified principal, assuming that m_Principal has been set.</td>
</tr>
<tr>
<td></td>
<td>See getPrincipalUserAuthority (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getPrincipalUserAuthority%28%29">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getPrincipalUserAuthority%28%29</a>)</td>
</tr>
<tr>
<td>getUserAuthorityCount()</td>
<td>Gets the number of searchable user authorities.</td>
</tr>
<tr>
<td></td>
<td>See getUserAuthorityCount (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getUserAuthorityCount%28%29">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getUserAuthorityCount%28%29</a>)</td>
</tr>
</tbody>
</table>
The following are miscellaneous methods that you might find useful:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>getUserAuthority()</td>
<td>Gets a specific user authority. The getUserAuthorityCount() method returns the index range.</td>
</tr>
<tr>
<td></td>
<td>See getUserAuthority (<a href="http://developer.novell.com/documentation/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getUserAuthority%28int%29">http://developer.novell.com/documentation/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#getUserAuthority%28int%29</a>)</td>
</tr>
<tr>
<td>setPrincipal()</td>
<td>Sets the principal to be authenticated by this class.</td>
</tr>
<tr>
<td></td>
<td>See setPrincipal (<a href="http://developer.novell.com/documentation/nacm/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#setPrincipal%28NIDPPrincipal%29">http://developer.novell.com/documentation/nacm/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#setPrincipal%28NIDPPrincipal%29</a>)</td>
</tr>
<tr>
<td>setPrincipalAttributes()</td>
<td>Sets attributes for a principal that has been authenticated.</td>
</tr>
<tr>
<td></td>
<td>See setPrincipalAttributes (<a href="http://developer.novell.com/documentation/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#setPrincipalAttributes%28java.lang.String%5b%5d,%20java.lang.String%5b%5d%29">http://developer.novell.com/documentation/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#setPrincipalAttributes%28java.lang.String%5b%5d,%20java.lang.String%5b%5d%29</a>)</td>
</tr>
</tbody>
</table>

**2.3.7 Other Methods**

The following are miscellaneous methods that you might find useful:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>showError()</td>
<td>Causes an error JSP to be executed to display an error message.</td>
</tr>
<tr>
<td></td>
<td>See showError (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#showError(java.lang.String)">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#showError(java.lang.String)</a>)</td>
</tr>
<tr>
<td>showJSP()</td>
<td>Forwards execution to a specific JSP.</td>
</tr>
<tr>
<td></td>
<td>See showJSP (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#showJSP(java.lang.String)">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#showJSP(java.lang.String)</a>)</td>
</tr>
<tr>
<td>escapeName()</td>
<td>Escapes characters typed by the user.</td>
</tr>
<tr>
<td></td>
<td>See escapeName (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#escapeName(java.lang.String)">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#escapeName(java.lang.String)</a>)</td>
</tr>
<tr>
<td>initializeRequest()</td>
<td>Initializes the authentication class with the current request/response.</td>
</tr>
<tr>
<td></td>
<td>Normally, this method is called only by the Identity Server when it initializes the authentication class with the current request/response.</td>
</tr>
<tr>
<td></td>
<td>See initializeRequest (<a href="http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#initializeRequest(HttpServletRequest">http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nidp/authentication/local/LocalAuthenticationClass.html#initializeRequest(HttpServletRequest</a>, HttpServletResponse, NIDPSession, boolean, java.lang.String)).</td>
</tr>
</tbody>
</table>
2.4 Understanding the Authentication Class Example

This section demonstrates how a password authentication class might be implemented by using the PasswordClass (http://developer.novell.com/documentation/samplecode/nacm31_sample/). All authentication classes are derived from the LocalAuthenticationClass, so you need to understand the key methods within it:

- Section 2.4.1, “Extending the Base Authentication Class,” on page 21
- Section 2.4.2, “Implementing the doAuthenticate Method,” on page 21
- Section 2.4.3, “Prompting for Credentials,” on page 21
- Section 2.4.4, “Verifying Credentials,” on page 22
- Section 2.4.5, “PasswordClass Example Code,” on page 22

2.4.1 Extending the Base Authentication Class

Authentication classes extend the base class LocalAuthenticationClass as shown on lines 11 and 12 of “PasswordClass Example Code” on page 22. The LocalAuthenticationClass has a single constructor that must be called as shown in lines 20 - 23. The Identity Server uses this constructor to pass the necessary properties and user store information defined in the Administration Console to the class.

The LocalAuthenticationClass defines a single abstract method, doAuthenticate(), which must be implemented by new classes. During user authentication, the Identity Server creates an instance of an authentication class and calls the authenticate() method, which in turn calls the doAuthenticate() method. By default, the class instance remains persistent, allowing the state to be preserved between requests/responses while credentials are obtained. If persistence is not needed, the mustPersist() method can be overloaded to return False so new instances of the class are created upon each call to the authenticate() method.

2.4.2 Implementing the doAuthenticate Method

Lines 43 - 65 in the PasswordClass Example Code show how the doAuthenticate() method is used. Return values from this method indicate to the Identity Server that the class has succeeded or failed to authenticate a user or that additional user credentials are required and must be obtained.

The call to the isFirstCallAfterPrevMethod() method on line 49 determines if the call to the class is following a successful authentication by another class executed by a method. If that is the case, any credentials provided for the previous class most likely are not valid for this class and should not be tested for (line 52). In this example, the handlePostedData() method is called to obtain and validate a username and password entered by a user.

2.4.3 Prompting for Credentials

When lines are encountered in the PasswordClass Example Code, it has been determined that a page needs to be returned through the execution of a JSP to enable credentials to be prompted for and returned. Tests are made to determine if provisioning should be enabled, and if a Cancel button and federated providers should be displayed. The return value of HANDLED_REQUEST or SHOW_JSP indicates that the class has responded to the request and requires more information to proceed.
2.4.4 Verifying Credentials

The handlePostedData() method does much of the important work of this example (lines 74 - 114 in the PasswordClass Example Code). Lines 81 - 100 attempt to obtain the credentials.

Line 86 provides an example of obtaining a class property configured by an administrator. In this case, a query can be defined by the administrator that can be used to look up a user instead of using the username and password. If the query is used, the authenticateWithQuery method is called at line 88. If a query is not available, the authenticateWithPassword() method is called at line 98.

If the credentials correctly identify the user, the value AUTHENTICATED is returned. If they fail to identify the user, NOT_AUTHENTICATED is returned.

When eDirectory is the user store and a password has either expired or is expiring, the return values PWD_EXPIRED and PWD_EXPIRING can be returned respectively. See lines 102 - 108.

Line 111 demonstrates how an attribute is used to set an error message that is displayed to the user by calling the method getUserErrorMsg().

2.4.5 PasswordClass Example Code

```
1 package com.novell.nidp.authentication.local;
2 3 import java.util.*;
4 5 import org.eclipse.higgins.sts.api.*;
6 7 import com.novell.nidp.*;
8 import com.novell.nidp.authentication.*;
9 import com.novell.nidp.common.authority.*;
10 11 public class PasswordClass extends LocalAuthenticationClass implements
12 STSAuthenticationClass
13 {
14    /**
15     * Constructor for form based authentication
16     *
17     * @param props      Properties associated with the implementing class
18     * @param uStores    List of ordered user stores to authenticate against
19     */
20    public PasswordClass(Properties props, ArrayList uStores)
21    {
22        super(props,uStores);
23    }
24
25    /**
26     * Get the authentication type this class implements
27     *
28     * @return  returns the authentication type represented by this class
29     */
30    public String getType()
31    {
32        return AuthnConstants.PASSWORD;
33    }
34
35    /**
36     * Perform form based authentication.  This method gets called on each
37     * response during authentication process
38     *
39     * @return  returns the status of the authentication process which is
40     * one of AUTHENTICATED, NOT_AUTHENTICATED, CANCELLED,
41     * HANDLED_REQUEST, PWD_EXPIRING, PWD_EXPIRED
42     */
43    protected int doAuthenticate()
```
if (isFirstCallAfterPrevMethod()) {
    // This wasn't first time method was called, so see if data can be processed
    int status = handlePostedData();
    if (status != NOT_AUTHENTICATED)
        return status;
}

String jsp = getProperty(AuthnConstants.PROPERTY_JSP);
if (jsp == null || jsp.length() == 0)
    jsp = NIDPConstants.JSP_LOGIN;
    m_PageToShow = new PageToShow(jsp);
    m_PageToShow.addAttribute(NIDPConstants.ATTR_URL, (getReturnURL() != null ? getReturnURL() : m_Request.getRequestURL().toString()));
    return SHOW_JSP;
}/**
 * Get and process the data that is posted from the form
 * @return returns the status of the authentication process which is
 *          one of AUTHENTICATED, NOT_AUTHENTICATED, CANCELLED,
 *          HANDLED_REQUEST, PWD_EXPIRING, PWD_EXPIRED
 */
private int handlePostedData()
{
    // Look for a name and password
    String id = m_Request.getParameter(NIDPConstants.PARM_USERID);
    String password = m_Request.getParameter(NIDPConstants.PARM_PASSWORD);

    // Check to see if admin has setup for a custom query
    String ldapQuery = checkForQuery();
    try {
        // using admin defined attributes for query
        if (ldapQuery != null)
            if (authenticateWithQuery(ldapQuery,password))
                return AUTHENTICATED;
    } catch (PasswordExpiringException pe) {
        return PWD_EXPIRING;
    } catch (PasswordExpiredException pe) {
        return PWD_EXPIRED;
    }
    // If using default of name and password
    else {
        if (id == null || id.length() == 0)
            return NOT_AUTHENTICATED;
        if (authenticateWithPassword(id,password))
            return AUTHENTICATED;
    }
    m_Request.setAttribute(NIDPConstants.ATTR_LOGIN_ERROR, getUserErrorMsg());
    return NOT_AUTHENTICATED;
    public NIDPPrincipal handleSTSAuthentication(ISecurityInformation securityInformation) {
        IUsernameToken usernameToken = (IUsernameToken)securityInformation.getFirst(IUsernameToken.class);
        if (null != usernameToken) {
            try {
                if (authenticateWithPassword(usernameToken.getUsername(), usernameToken.getPassword()))
                    return getPrincipal();
            } catch (PasswordExpiringException pe) {
                return getPrincipal();
            } catch (PasswordExpiredException pe) {}
        } return null;
    }

2.5 Localizing the Prompts in Your Authentication Class

You need to create a JSP page for displaying the login prompts. When doing so, you might want to allow the prompts to be displayed in multiple languages.

To enable the text so that it can be displayed in multiple languages, you need to do the following:

- Section 2.5.1, “Creating a Properties File,” on page 24
- Section 2.5.2, “Creating a Resource Class,” on page 25
- Section 2.5.3, “Creating or Modifying a JSP Page,” on page 25

2.5.1 Creating a Properties File

You need to create a list of the strings to be displayed when prompting users for login credentials and reacting to their input. You need to create a string constant for each string and place the string constant and string in a properties file. The following properties file contains some sample string constants for a few of the prompts that your JSP page might need.

LOGIN=Login
USERNAME_PROMPT=Username:
CONTACT_ADMINISTRATOR_PROMPT=Contact your system administrator.
SAMPLE_AUTH_FAILED_MSG=Authentication Failed.
CONTINUE_PROMPT=Continue
CONTINUE_TITLE=Continue
LOGIN_ERROR_PROMPT=Authentication Error.

The name for this properties file needs to end with the Java defined constants for each language. For the English version for use in the United States, the file would end with en_US.properties, for example, SampleResources_en_US.properties. The base portion of the name (in this example, SampleResources) stays the same for all languages.

You need to create such a file, with the appropriately translated strings and name, for each language you want to support.
2.5.2 Creating a Resource Class

You need to extend the `com.novell.nidp.resource.NIDPResDesc` class with a resource class that knows how to call your properties files and retrieve the strings. The following sample code extends the `NIDPResDesc` class with a class called `SampleResDesc`, defines the base name for the properties file (`SampleResources`), and defines a string constant for each string in the properties file.

```
import com.novell.nidp.resource.NIDPResDesc;

public class SampleResDesc extends NIDPResDesc {
    private static final String SAMPLE_BUNDLE_BASENAME = "SampleResources";
    private static final String KEYS_PREFIX = "";

    // Names of localized strings and messages
    public static final String LOGIN = "LOGIN";
    public static final String USERNAME_PROMPT = "USERNAME_PROMPT";
    public static final String CONTACT_ADMINISTRATOR_PROMPT = "CONTACT_ADMINISTRATOR_PROMPT";
    public static final String SAMPLE_AUTH_FAILED_MSG = "SAMPLE_AUTH_FAILED_MSG";
    public static final String CONTINUE_PROMPT = "CONTINUE_PROMPT";
    public static final String CONTINUE_TITLE = "CONTINUE_TITLE";
    public static final String LOGIN_ERROR_PROMPT = "LOGIN_ERROR_PROMPT";

    private static SampleResDesc m_instance = null;

    private SampleResDesc() {
        super(SAMPLE_BUNDLE_BASENAME, KEYS_PREFIX);
    }

    public static SampleResDesc getInstance() {
        if (null == m_instance) {
            m_instance = new SampleResDesc();
        }
        return m_instance;
    }
}
```

2.5.3 Creating or Modifying a JSP Page

The JSP page generates the prompts for user credentials by calling your extended resource class to retrieve the strings. The following snippet of a JSP page gets the local language code, and then calls the extended resource class (`SampleResDesc`) to display the string for the string constant `USERNAME_PROMPT`.
For your authentication class, this JSP snippet needs to be extended to include the prompts for the other authentication credentials your class requires. As you add prompts to the JSP page, these constants need to be added to your resource class and properties files.

The name of this JSP page needs to correspond to the page you call in your authentication class. See lines 109 - 111 in the sample class (Section 2.4.5, “PasswordClass Example Code,” on page 22).

When you create the jar file for your authentication class, the properties files and the Java resource file need to be included. The JSP page for your authentication class needs to be copied to the /opt/novell/nids/lib/webapp/jsp directory of the Identity Server.

2.6 Deploying Your Authentication Class

1. Create a jar file for your authentication class and any associated classes.
2. Copy the jar file to the following location in the Identity Server:
   - Linux: /opt/novell/nam/idp/webapps/nidp/WEB-INF/lib
   - Windows: C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib

   If the Identity Server is in a cluster, the file needs to be copied to all members of the cluster.
3. (Conditional) If you created a custom JSP page for your authentication class, copy it to the /opt/novell/nids/lib/webapp/jsp directory of the Identity Server.

   If the Identity Server is in a cluster, the file needs to be copied to all members of the cluster.
4 In the Administration Console, click **Access Manager > Identity Servers > Edit > Local > Classes.**

<table>
<thead>
<tr>
<th><strong>General</strong></th>
<th><strong>Local</strong></th>
<th><strong>Liberty</strong></th>
<th><strong>SAML 1.1</strong></th>
<th><strong>SAML 2.0</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>User Stores</td>
<td>Classes</td>
<td>Methods</td>
<td>Contracts</td>
<td>Defaults</td>
</tr>
</tbody>
</table>

5 From this page, click **New.**

![Create Authentication Class](image)

**Create Authentication Class**

**Step 1 of 2:** Specify name and java class.

Display name: **NewClass**
Java class: **Other**
Java class path: **com.sample.newclass**

6 Fill in the following fields:

**Display name:** Specify a name that the Administration Console can use to identify this class.

**Java class:** For a new class, select **Other.** This allows you to specify the path name of your Java class.

**Java class path:** Specify the name of your Java class.

7 Click **Next,** and specify any needed properties of your class.

This is dependent upon your class. You need to specify properties only if your class requires them.

This information is returned to your class in the **props** parameter when your class is called.

8 Click **Finish.**

9 To configure a method for your class, click **Methods > New,** and select your class for the **Class** field.

When you configure a method, you specify which user stores can be used for authentication. This information is returned to your class in the **uStores** parameter when your class is called.

For more information, see “Configuring Authentication Methods” ([link](http://www.novell.com/documentation/novellaccessmanager32/identityserverhelp/data/configureauthmethod.html)) in the NetIQ Access Manager 3.2 Identity Server Guide.

10 Click **Finish.**

11 To configure a contract for your class, click **Contracts > New,** and move your class to be a value in the **Methods** list.

For more information, see “Configuring Authentication Contracts” ([link](http://www.novell.com/documentation/novellaccessmanager32/identityserverhelp/data/localcontract.html)) in the NetIQ Access Manager 3.2 Identity Server Guide.
12 (Optional) Default contracts can be specified for each authentication type that might be required by a service provider. These contracts are executed when a request for a specific authentication type comes from a service provider.

For more information, see “Supported Authentication Class Types” on page 17 and “Specifying Authentication Defaults” (http://www.novell.com/documentation/novellaccessmanager32/identityserverhelp/data/authdefaults.html) in the NetIQ Access Manager 3.2 Identity Server Guide.

13 Click Finish > OK.

14 On the Identity Servers page, click Update.

15 Update any associated devices (Access Gateways, SSL VPN servers, or J2EE* Agents) that are using this Identity Server configuration.
LDAP Server Plug-In

An LDAP Server plug-in module is a Java class that allows an unsupported LDAP server to be used with Access Manager 3.0 SP4 or above. The three supported LDAP servers are eDirectory™, Active Directory, and Sun ONE. Any other directory types require an LDAP Server plug-in.

3.1 Prerequisites

To develop an LDAP server plug-in:

- Have an integrated Java development environment.
- Copy the NAMCommon.jar file in the following directory of your Identity Server to your development project:
  - Linux: /opt/novell/nam/idp/webapps/nidp/WEB-INF/lib
  - Windows: C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib

3.2 Creating the LDAP Plug-In

The project used to create the plug-in must include the NAMCommon.jar file shipped with Access Manager. This JAR file is located in the following directory:

- Linux: /opt/novell/nam/idp/webapps/nidp/WEB-INF/lib
- Windows: C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib

To create an LDAP Server plug-in, you need to create a public class that extends the abstract the com.novell.nam.common.ldap.jndi.LDAPStorePlugin class.

In your public class, you need to implement the following methods:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>getDirectoryName()</td>
<td>Needs to return the name you want displayed for your directory type.</td>
</tr>
<tr>
<td></td>
<td>For eDirectory, this method returns “Novell eDirectory” for this string.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>getDirectoryName()</td>
<td>Needs to return the name you want displayed for your directory type.</td>
</tr>
<tr>
<td></td>
<td>For eDirectory, this method returns “Novell eDirectory” for this string.</td>
</tr>
</tbody>
</table>
The following methods can be implemented, and might be required for your LDAP directory:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>getGUIDAttributeName()</code></td>
<td>Needs to return the name of the globally unique ID attribute that uniquely identifies all objects in this type of directory. For eDirectory, this is the GUID attribute.</td>
</tr>
<tr>
<td><code>getMemberAttributeName()</code></td>
<td>Needs to return the name of the attribute that is used to identity an object as a member of a group. For eDirectory, this is the member attribute.</td>
</tr>
<tr>
<td><code>getUserClassName()</code></td>
<td>Needs to return the name of the class that is used to create users. For eDirectory, this is the User class.</td>
</tr>
<tr>
<td><code>getUserNameNamingAttrName()</code></td>
<td>Needs to return the name of the attribute that is used to name users. For eDirectory, this is the cn attribute.</td>
</tr>
<tr>
<td><code>preUserAccountCreation()</code></td>
<td>Needs to return an attributes object that contains an array of attributes, with each member contain the name of an attribute and its value. This attributes object needs to contain all the attributes that are required to create a user in the LDAP directory. This usually consists of the name of the object class, the naming attribute, and a password. For eDirectory, this also includes the sn attribute.</td>
</tr>
<tr>
<td><code>postUserAccountCreation()</code></td>
<td>Modifies a user’s attributes after the user has been created. Some LDAP directories do not let you set a password until after the user account has been created. The method contains a strCorrelationId parameter that you can use to match the user with the user in the preUserAccountCreation() method.</td>
</tr>
<tr>
<td><code>onCreateConnection()</code></td>
<td>Allows the plug-in to check the connection creation parameters and modify them, if needed. This method is called just before a connection is created with the LDAP directory.</td>
</tr>
<tr>
<td><code>onCreateConnectionException()</code></td>
<td>Allows you to customize the exception that is thrown when the process to create an LDAP connection fails and throws an authentication exception. This method is overloaded and requires an AuthenticationException parameter.</td>
</tr>
<tr>
<td><code>onCreateConnectionException()</code></td>
<td>Allows you to customize the exception that is thrown when the process to create an LDAP connection fails and throws a connection exception. This method is overloaded and requires an OperationNotSupportedException parameter.</td>
</tr>
</tbody>
</table>

For details about the LDAPStorePlugin class and methods, see the Javadoc API Reference (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/com/novell/nam/common/ldap/jndi/LDAPStorePlugin.html).

For an example plug-in that extends the LDAPStorePlugin class and implements the required methods and some of the optional methods, see Section 3.3, “eDirectory Plug-In,” on page 31.
3.3 eDirectory Plug-In

The following code is from the eDirectory plug-in:

```java
package com.novell.nam.common.ldap.jndi;

import javax.naming.AuthenticationException;
import javax.naming.OperationNotSupportedException;
import javax.naming.directory.Attributes;
import javax.naming.directory.BasicAttributes;
import javax.naming.ldap.ExtendedRequest;
import javax.naming.ldap.ExtendedResponse;
import com.novell.nam.common.ldap.jndi.ext.GetEffectiveRightsRequest;
import com.novell.nam.common.ldap.jndi.ext.GetEffectiveRightsResponse;
import com.novell.nam.common.ldap.jndi.ext.NdsAttributeRights;
import com.novell.nam.common.ldap.jndi.ext.NdsEntryRights;
import com.novell.nam.common.ldap.jndi.ext.NdsRights;

public class LDAPStorePluginEDir extends LDAPStorePlugin
{
    public String getDirectoryName()
    {
        return "Novell eDirectory";
    }

    public String getGUIDAttributeName()
    {
        return "GUID";
    }

    public String getMemberAttributeName()
    {
        return "member";
    }

    public String getUserClassName()
    {
        return "User";
    }

    public String getUserNamingAttrName()
    {
        return "cn";
    }

    public Attributes preUserAccountCreation(String strCorrelationId, String name,
                                              String password, String context)
    {
        Attributes attrs = new BasicAttributes();
        attrs.put(JNDIConstants.LDAP_ATTR_OBJECTCLASS,"User");
        attrs.put(JNDIConstants.LDAP_ATTR_CN, name);
        attrs.put(JNDIConstants.LDAP_ATTR_SN, "NAM Generated");
        attrs.put("userPassword", password);
        return attrs;
    }

    public void onCreateConnectionException(AuthenticationException ae)
        throws JNDIException
    {
        // Check the return message to see if we can interpret it.
        String strDetails = ae.getMessage();
        // Look for "Incorrect Password"
        int iIdxLdapErrorCode = strDetails.indexOf(" 49 ");
        int iIdxNDSErrorCode = strDetails.indexOf("(-669)"堕"");
        if ((-1 != iIdxLdapErrorCode) && (-1 != iIdxNDSErrorCode))
        {
            if (iIdxLdapErrorCode < iIdxNDSErrorCode)
            {
            }
        }
    }
}
```

{   // The user typed in an incorrect password
    throw new JNDIExceptionIncorrectPassword(ae, ae.getLocalizedMessage());
}

// Look for Expired Password
int iIdxLdapErrorCode = strDetails.indexOf(" 49 ");
int iIdxNDSErrorCode = strDetails.indexOf("(-222)");
if ((-1 != iIdxLdapErrorCode) && (-1 != iIdxNDSErrorCode))
{
    if (iIdxLdapErrorCode < iIdxNDSErrorCode)
    {   // The password for this user account has expired.
        throw new JNDIExceptionExpiredPassword(ae, ae.getLocalizedMessage());
    }
}

public void onCreateConnectionException(OperationNotSupportedException onse)
    throws JNDIException
{
    String strDetails = onse.getMessage();
    // Look for "Incorrect Password"
    int iIdxLdapErrorCode = strDetails.indexOf(" 53 ");
    if (iIdxLdapErrorCode != -1)
    {
        int iIdxNDSErrorCode = strDetails.indexOf("(-220)");
        // Check for account disabled (or a restriction has disabled the
        account)
        if (iIdxNDSErrorCode != -1 && iIdxLdapErrorCode < iIdxNDSErrorCode)
            throw new JNDIExceptionDisabledAccount(onse, onse.getLocalizedMessage());
    }
    // Check for intruder detection disablement
    iIdxNDSErrorCode = strDetails.indexOf("(-218)");
    if (iIdxNDSErrorCode != -1 && iIdxLdapErrorCode < iIdxNDSErrorCode)
        throw new JNDIExceptionRestrictedAccount(onse, onse.getLocalizedMessage());
    // Check for intruder detection disablement
    iIdxNDSErrorCode = strDetails.indexOf("(-197)");
    if (iIdxNDSErrorCode != -1 && iIdxLdapErrorCode < iIdxNDSErrorCode)
        throw new JNDIExceptionIntruderDetection(onse, onse.getLocalizedMessage());
}

public boolean supportsEffectiveRightsRetrieval()
{
    return true;
}

public ExtendedRequest getEntryEffectiveRightsExtendedRequest(String objectDN, String trusteeDN)
{
    return new GetEffectiveRightsRequest(objectDN, trusteeDN);
}

public int getEntryEffectiveRights(ExtendedResponse response)
{
    if (response instanceof GetEffectiveRightsResponse)
    {
        NdsRights rights = ((GetEffectiveRightsResponse)response).getRights();
        return rights.getRights();
    }
    return 0;
}

public ExtendedRequest getAttributeEffectiveRightsExtendedRequest(String
objectDN, String trusteeDN)
    {
        return new GetEffectiveRightsRequest(objectDN, trusteeDN,
            NdsRights.ALL_ATTRIBUTES_RIGHTS);
    }

    public int getAttributeEffectiveRights(ExtendedResponse response)
    {
        if (response instanceof GetEffectiveRightsResponse)
        {
            NdsRights rights = ((GetEffectiveRightsResponse)response).getRights();
            return rights.getRights();
        }
        return 0;
    }

    public boolean hasEntrySupervisorRights(int iEntryRights)
    {
        return new NdsEntryRights(iEntryRights).hasSupervisor();
    }

    public boolean hasEntryBrowseRights(int iEntryRights)
    {
        return new NdsEntryRights(iEntryRights).hasBrowse();
    }

    public boolean hasEntryRenameRights(int iEntryRights)
    {
        return new NdsEntryRights(iEntryRights).hasRename();
    }

    public boolean hasEntryDeleteRights(int iEntryRights)
    {
        return new NdsEntryRights(iEntryRights).hasDelete();
    }

    public boolean hasEntryAddRights(int iEntryRights)
    {
        return new NdsEntryRights(iEntryRights).hasAdd();
    }

    public boolean hasAttributeCompareRights(int iAttributeRights)
    {
        return new NdsAttributeRights(NdsRights.ALL_ATTRIBUTES_RIGHTS,
            iAttributeRights).hasCompare();
    }

    public boolean hasAttributeReadRights(int iAttributeRights)
    {
        return new NdsAttributeRights(NdsRights.ALL_ATTRIBUTES_RIGHTS,
            iAttributeRights).hasRead();
    }

    public boolean hasAttributeWriteRights(int iAttributeRights)
    {
        return new NdsAttributeRights(NdsRights.ALL_ATTRIBUTES_RIGHTS,
            iAttributeRights).hasWrite();
    }

    public boolean hasAttributeSelfRights(int iAttributeRights)
    {
        return new NdsAttributeRights(NdsRights.ALL_ATTRIBUTES_RIGHTS,
            iAttributeRights).hasSelf();
    }

    public boolean hasAttributeSupervisorRights(int iAttributeRights)
    {
        return new NdsAttributeRights(NdsRights.ALL_ATTRIBUTES_RIGHTS,
            iAttributeRights).hasSupervisor();
    }
public boolean hasObjectSearchRights(int iEntryRights, int iAttributeRights) {
    NdsEntryRights entryRights = new NdsEntryRights(iEntryRights);
    NdsAttributeRights attributeRights = new NdsAttributeRights(NdsRights.ALL_ATTRIBUTES_RIGHTS, iAttributeRights);
    if (entryRights.hasSupervisor()) {  // Supervisor entry rights are sufficient for doing a user search
        return true;
    }
    if (entryRights.hasBrowse()) {  // Browse entry rights plus supervisor/compare attribute rights are sufficient for doing a user search
        if (attributeRights.hasSupervisor() || attributeRights.hasCompare()) {
            return true;
        }
    }
    return false;
}

### 3.4 Installing and Configuring the LDAP Plug-In

After you have created your plug-in, you need to configure Access Manager to use it.

1. Copy the plug-in class file to the Identity Server:
   1a. Copy it to the following directory under the correct directory structure as per the class package:
      - **Linux:**
        - If you want to use a LDAP-plugin class file: `/opt/novell/nam/idp/webapps/nidp/WEB-INF/classes`
        - If you want to use a LDAP-plugin class in a jar file: `/opt/novell/nam/idp/webapps/nidp/WEB-INF/lib`
      - **Windows:**
        - If you want to use a LDAP-plugin class file: `C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\classes`
        - If you want to use a LDAP-plugin class in a jar file: `C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib`
      If your class package name is `com.acme.ldap.plugin`, you need to create the `com`, `acme`, `ldap`, and `plugin` directories.
   1b. Repeat Step 1a for each Identity Server in the cluster.

2. To associate an LDAP Server plug-in with the Custom1, Custom2, or Custom3 directory type, modify the web.xml file on the Identity Server:
   2a. In a text editor, open the following file:
      - **Linux:** `/opt/novell/nam/idp/webapps/nidp/WEB-INF/web.xml`
      - **Windows:** `C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\web.xml`
   2b. Add an entry for the `ladpStorePlugins` context parameter. Your entry should look similar to the following to associate the `com.acme.plugin.Sample1Plugin` with the Custom1 directory type.
<context-param>
<param-name>ldapStorePlugins</param-name>
<param-value>custom1:com.acme.ldap.plugin.Sample1Plugin</param-value>
</context-param>

You can add up to three values, using the following format:

custom1:classname;custom2:classname;custom3:classname

2c Repeat Step 2a through Step 2b on each Identity Server in the cluster.

3 In the Administration Console, configure the Identity Server to use the new directory type for a user store.

3a Click Access Manager > Identity Servers > Edit > Local.

3b Either select the name of a user store or click New.

3c For the Directory type, select the custom string you have configured in Step 2.

3d Complete one of the following:
   • For a new user store, configure the other required values, then click Finish.
   • For a modified user store, modify the other options to fit the new directory type, then click OK.

3e Update the Identity Server.

4 (Optional) To verify that the new directory type is functioning correctly, log in to the user portal by using the credentials of a user in the user store.

If you encounter any errors, see Section 3.5, “Troubleshooting,” on page 35.

3.5 Troubleshooting

If problems with LDAP Server plug-ins are detected, the following error messages are issued during Access Manager initialization. To log these messages to the catalina.out file, set the application component file logger to the warning level or higher.

• “300105029: Cannot load LDAP Store Plugin class: {0}. Error: {1}.” on page 35
• “300105030=Cannot instantiate LDAP Store Plugin class: {0}. Error: {1}.” on page 35
• “300105031=An unknown or unsupported user store directory type {0} was found for the user store named {1}. Defaulting to eDirectory!” on page 36

300105029: Cannot load LDAP Store Plugin class: {0}. Error: {1}.

Cause: The java.lang.Class.forName() method failed to load the LDAP Store Plugin class.

Action: Verify that a valid Java class file is available in Access Manager’s class path for the referenced plug-in class file. Check the modifications you made to the web.xml file (see Step 2 on page 34).

300105030=Cannot instantiate LDAP Store Plugin class: {0}. Error: {1}.

Cause: The java.lang.Class.newInstance() method failed to instantiate the LDAP Store Plug-in class.

Action: Verify that a valid Java class file is available in Access Manager’s class path for the referenced plug-in class file. Also, ensure that the LDAP Store Plug-in has a zero parameter constructor.
300105031=An unknown or unsupported user store directory type {0} was found for the user store named {1}. Defaulting to eDirectory!

**Cause:** A user store was configured with an unrecognized directory type. The configuration was manually modified to include an invalid directory type specifier or the configuration has been corrupted.

**Action:** Examine the supplied error detail and take applicable actions. If the directory type is wrong, reconfigure the user store with the correct directory type. If the configuration is corrupted, delete the user store configuration, then re-create it.
The Policy Extension API

The policy extension API is a new feature that has been added to Access Manager 3.1. It allows you to enhance the Access Manager policy engine so that an external module can perform the following types of tasks:

- Evaluate a condition and return results that Access Manager can use to determine enforcement.
- Provide data from an external source that Access Manager can use to evaluate a condition or to inject into an HTTP header.
- Provide actions that are performed when the policy conditions evaluate to True.

This section describes the basic characteristics of a policy extension, describes how to create the three possible types of extensions, then explains how to install and use the extension in an Access Manager policy.

- Section 4.1, “Getting Started,” on page 37
- Section 4.2, “Common Elements and Tasks,” on page 42
- Section 4.3, “Creating an Extension,” on page 50
- Section 4.4, “Installing and Configuring an Extension,” on page 59
- Section 4.5, “Sample Codes,” on page 62

4.1 Getting Started

The following sections explain the requirements for developing an extension and provide an overview of the possible types of extensions and an overview of how the Access Manager policy engine interacts with an extension.

- Section 4.1.1, “Prerequisites,” on page 37
- Section 4.1.2, “Types of Policy Extensions,” on page 38
- Section 4.1.3, “How the Policy Engine Interacts with an Extension,” on page 38

4.1.1 Prerequisites

- An integrated Java development environment.
• Copy the nxpe.jar file from the following directory of your Access Manager device to your development environment:
  • Linux: /opt/novell/nam/idp/webapps/nidp/WEB-INF/lib (for roles)
    or
    /opt/novell/nam/mag/webapps/nesp/WEB-INF/lib (for other policies)
  • Windows: C:\Program Files (x86)\Novell\Tomcat\webapps\nidp\WEB-INF\lib (for roles)
    or
    C:\Program Files\Novell\Tomcat\webapps\nesp\WEB-INF\lib (for other policies)

### 4.1.2 Types of Policy Extensions

You can use the policy extension API to create the following types of policy extensions:

• **Action:** This type of extension allows a new action to be added to the policy. When the policy is evaluated and the conditions evaluate to true, the extension is called so that it can execute its action. The action can be a permit, deny, or obligation action.

  For example, when a user is denied access to an Access Gateway resource, the extension generates a dynamic page that is displayed to the user and updates a database with the details of the attempted access.

  Actions extensions are used in Access Gateway Authorization policies.

• **Condition:** This type of extension allows a new condition to be added to the policy. When the policy is evaluated, the extension is called to evaluate the condition and is responsible for returning a True, False, or Error value for the condition.

  For example, the Acme company requires historical sales records to be available via the corporate intranet. Access to the records is granted according to regular procedures set up by the accounting department. The accounting department manages the access rights in a database that supports SQL. In order for Access Manager to take advantage of the access granting process already in place in the accounting department, a condition extension is created that queries the accounting access rights database and returns true, false, or error.

  Condition extensions are used in Access Gateway Authorization policies and Identity Server Role policies.

• **Data:** This type of extension retrieves data from an external source that can then be injected into a policy and used as input for evaluating a condition or an action.

  For example, suppose a policy needs to use the role assignments made in an Oracle* database to determine whether a user is assigned an Access Manager role. The data extension could retrieve the role assignments from the database and return them in a string object that could be used by Access Manager in evaluating the condition for the Role policy.

  Data extensions can be used in Access Gateway Authorization policies, Access Gateway Identity Injection policies, Identity Server Role policies, External Attribute Source policies.

### 4.1.3 How the Policy Engine Interacts with an Extension

When the policy engine processes a policy, the first step is to configure the policy. The following elements can be marked as external elements in the policy:

• Conditions
Data elements
Actions

As the policy engine is configuring the policy, it calls the extension when it encounters an external element. The engine expects the extension to return an object that is specific to the type of extension, unless an exception occurs. The object contains any data that the extension needs for processing, and the object is returned to the policy engine with the data the engine needs to continue processing the policy. For specific details, see the following:

- “How the Policy Engine Interacts with a Condition Extension” on page 39
- “How the Policy Engine Interacts with a Data Extension” on page 40
- “How the Policy Engine Interacts with an Action Extension” on page 41

How the Policy Engine Interacts with a Condition Extension

When the policy engine is processing a policy and encounters a condition marked as an extension, the engine instantiates an object that must comply with the NxpeConditionFactory interface. The engine then calls the getInstance method, and expects an NxpeCondition object from the extension unless an NxpeException is thrown by the NxpeConditionFactory object.

This process is illustrated in the following code snippet:

```java
public interface NxpeConditionFactory
{
    NxpeCondition getInstance()
        throws NxpeException;
} /* NxpeConditionFactory */
```

During the next part of the configuration phase, the policy engine calls the NxpeCondition.initialize method, passing an NxpeParameterList object for the configuration parameters. The configuration parameters are used to initialize the NxpeCondition object and are the parameters that the extension needs for evaluating the condition. The values for these configuration parameters are retrieved at evaluation from the NxpeInformationContext object that is passed by the policy engine.

The initialize method is guaranteed to be called before any other method, followed by a method that sets an ID for the condition.

The following code snippet illustrates this process:

```java
public interface NxpeCondition
{
    void initialize(
        NxpeParameterList configurationValues)
        throws NxpeException;

    NxpeResult evaluate(
        NxpeInformationContext informationContext,
        NxpeResponseContext responseContext)
        throws NxpeException;

    void setInterfaceId(
        String interfaceId)
        throws NxpeException;
}
```
How the Policy Engine Interacts with a Data Extension

When the policy engine is processing a policy and encounters a data element marked as an extension, the engine instantiates an object that must comply with the NxpeContextDataElementFactory interface. The engine then calls the getInstance() method, passing the name, enumerativeValue, and parameter as arguments, and expects the extension to return an NxpeContextDataElement object unless the NxpeContextDataElementFactory object throws an NxpeException.

The following code snippet illustrates this process:

```java
public interface NxpeContextDataElementFactory
{
    NxpeContextDataElement getInstance(
        String name,
        int enumerativeValue,
        String parameter)
    throws NxpeException;
}

During the next part of the configuration phase, the policy engine calls the NxpeContextDataElement.initialize() method, passing an NxpeParameterList object with configureParameters. The configureParameters are used to initialize the NxpeContextDataElement object and are the parameters required during policy evaluation. It is expected that the values for these configureParameters are retrieved from the NxpeInformationContext object passed by the policy engine.

The following code snippet illustrates this process:

```java
public interface NxpeContextDataElement
{
    void initialize(
        NxpeParameterList configurationValues)
    throws NxpeException;

    String getName();
    int getEnumerativeValue();
    String getParameter();

    Object getValue(
        NxpeInformationContext informationContext,
        NxpeResponseContext responseContext)
    throws NxpeException;
}

The policy engine calls the NxpeContextDataElement.initialize() method to initialize a component in preparation for policy evaluation. Derived classes are required to implement this method. This method is guaranteed to be called before any other method is called, because it is part of object construction.

The configurationValues parameter contains a list of the configuration data required by the external ContextDataElement handler. If the context data element wants to preserve configuration data, it must maintain a reference to the configuration value parameters.
How the Policy Engine Interacts with an Action Extension

When the policy engine is processing a policy and encounters an action marked as an extension, the engine instantiates an object that must comply with the NxpeActionFactory interface. The engine then calls the getInstance() method, and expects the extension to return an NxpeAction object unless the NxpeActionFactory object throws an NxpeException.

This process is illustrated in the following code snippet:

```java
public interface NxpeActionFactory
{
    NxpeAction   getInstance()
      throws NxpeException;
}
/* NxpeActionFactory */
```

During the next part of the configuration phase, the policy engine calls the NxpeAction.initialize() method, passing an NxpeParameterList object with the configureParameters. The configureParameters are used to initialize the NxpeAction object. The configureParameters are those parameters needed during NxpePolicy.evaluate(). It is expected that the values for these configureParameters are retrieved from the NxpeInformationContext passed by the policy engine.

The following code snippet illustrates this process:

```java
public interface NxpeAction
{
    void initialize(
      NxpeParameterList   configurationValues)
      throws NxpeException;
}
/* NxpeAction */
```

The NxpeParameterList is a list of configuration data required by the external action extension. If the action extension wants to preserve configuration data, the extension must maintain a reference to the configuration value parameters.

The second method called is the setInterfaceId method, which sets up a value for trace evaluation. The interfaceId parameter sets a unique sting value for the action. The following code snippet illustrates this last step in the NxpeAction interface.

```java
void setInterfaceId(
    String   interfaceId)
      throws NxpeException;
}
/* NxpeAction */
```

The policy engine calls the doAction method to initiate the action. It has the following parameters:

- The informationCtx parameter contains the policy enforcement Point information context to query for values
- The responseCtx is a reflection object for communicating detailed response information back to the application. This is additional information and does not replace the need to place an action completion status in the return value from this call.

This method returns an NxpeResult, which contains an error code, permit, deny, or obligation. Derived classes are require to override this method to implement the supported action.

The following code snippet illustrates this process:

```java
NxpeResult doAction(
    NxpeInformationContext   informationCtx,
    NxpeResponseContext      responseCtx)
      throws NxpeException;
```
4.2 Common Elements and Tasks

As you develop your extension, the extension needs to perform the following tasks:

- Section 4.2.1, “Implementing Common Elements,” on page 42
- Section 4.2.2, “Initializing the Factory Object,” on page 43
- Section 4.2.3, “Retrieving Information from the Identity Server User Store,” on page 44
- Section 4.2.4, “Implementing the Extension Interface,” on page 45

For information about the Extension API interfaces and class, see the Javadoc API Reference (http://www.novell.com/documentation/developer/nacm32/nacm_enu/api/).

4.2.1 Implementing Common Elements

Each extension type has two interfaces:

- A factory interface that contains the method for initializing an extension object with data from the engine that the extension can use to retrieve data from an external source or to evaluate a condition or an action.
- An extension interface that contains the methods that need to be implemented for the specific type of extension. For example, the NxpeCondition interface contains the method for evaluating the condition and returning True, False, or Error.

All the extensions need to implement both interfaces for the extension type and use the NxpeResult class for return codes and the NxpeException class for exceptions.

Return Codes in the NxpeResult Class

The NxpeResult class allows an extension to return the following values:

<table>
<thead>
<tr>
<th>Return Code</th>
<th>Extension Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>ConditionFalse</td>
<td>Condition</td>
<td>The compared values do not match, so the condition evaluation resolved to False.</td>
</tr>
<tr>
<td>ConditionTrue</td>
<td>Condition</td>
<td>The compared values match, so the condition evaluation resolved to True.</td>
</tr>
<tr>
<td>ConditionUnknown</td>
<td>Condition</td>
<td>The values could not be compared, so the results are unknown. This is comparable to the Result on Condition Error option when creating a policy.</td>
</tr>
<tr>
<td>Deny</td>
<td>Action</td>
<td>A deny action was applied.</td>
</tr>
<tr>
<td>ErrorBadData</td>
<td>Context Data</td>
<td>The data cannot be parsed. This result can be returned with the NxpeException class.</td>
</tr>
<tr>
<td>ErrorCodeComponent</td>
<td></td>
<td>Reserved.</td>
</tr>
<tr>
<td>ErrorConfigInitialization</td>
<td>All</td>
<td>The initialize method for the extension encountered an error. This result can be returned with the NxpeException class.</td>
</tr>
<tr>
<td>ErrorDataUnavailable</td>
<td>Context Data</td>
<td>The requested data is not available. This result can be returned with the NxpeException class.</td>
</tr>
</tbody>
</table>
The Policy Extension API

Constructors in the NxpeException Class

The NxpeException class allows you to use a constructor that throws exceptions with the following information:

- No information
- With a string message
- With a string message and a cause
- With a result from the NxpeResult class. See “Return Codes in the NxpeResult Class” on page 42.
- With a cause and a result from the NxpeResult class
- With a string message and a result from the NxpeResult class
- With a string message, a cause, and a result from the NxpeResult class

4.2.2 Initializing the Factory Object

All extension types need to implement the factory interface for the extension type and initialize an object specific to its type. The policy engine uses this object to send the parameter information about the user making the request to the extension. The extension uses this object to return its results to the policy engine.

The following code sample illustrates how to implement the factory interface. It uses the NxpeContextDataElementFactory to create an LDAPGroupDataElement object.
4.2.3 Retrieving Information from the Identity Server User Store

All extensions need to access an external data store and retrieve information from it. You need to know the type of data that your extension is going to retrieve, and then design how you are going to retrieve it.

If the extension needs to establish a connection to the external data store and log in to retrieve information, consider using one of the following methods:

- The extension can use the credentials that authenticated the user to the Identity Server to log in as a user in the external data store. This method assumes that the user has the same credentials in the Identity Server user store and the external data store.
- You can create an LDAP attribute in the Identity Server user store and store an X.509 certificate that you can use to access the external data store.
- You can create configuration parameters that allow the administrator of the Administration Console to enter a username and password for accessing the external data store. The password is entered in clear text in the Administration Console, so this is not a secure method. To minimize the security risk, you can create a special user in the external data store whose rights are restricted to retrieving only the information required by the extension. If the retrieved information is not sensitive, this simple solution might not present a security risk.

When you create configuration parameters, you need to provide documentation for the administrator who installs the extension. Each configuration parameter requires a name, an ID, and a mapping to a data item. You need to document these for the administrator.
The name and ID you create to fit your programing requirements. These must be mapped to a data item available for the extension type.

**NOTE:** The data items are returned as strings, or as string arrays if they are multivalued.

Your external data store and the methods available for accessing its data determine whether any of the data items are useful in making the connection to the external data store.

For the data items specific to an extension type, see the following:

- “Available Configuration Parameters for a Data Context Extension” on page 51
- “Available Configuration Parameters for a Condition Extension” on page 55
- “Available Configuration Parameters for an Action Extension” on page 58

### 4.2.4 Implementing the Extension Interface

All extensions need to perform the following tasks.

- “Task 1: Specifying the Required Import Files” on page 45
- “Task 2: Defining the Configuration Parameters” on page 46
- “Task 3: Retrieving Configuration Parameters before Policy Evaluation” on page 46
- “Task 4: Implementing the Extension Methods” on page 47
- “Task 5: Retrieving Configuration Parameters at Policy Evaluation” on page 47
- “Task 6: Connecting with the External Data Source” on page 48
- “Task 7: Returning from an Extension” on page 48
- “Task 8: Error Handling” on page 49
- “Task 9: Performing Extension-Specific Tasks” on page 50

#### Task 1: Specifying the Required Import Files

All extensions need a package line and the following import lines. The package line for the sample needs to be replaced with the package line for your extension. The first import line needs to be modified to import the interface for the extension type you are creating. The other import lines are standard for all extensions.

```java
package ContextDataElement;
import com.novell.nxpe.NxpeContextDataElement;
import com.novell.nxpe.NxpeException;
import com.novell.nxpe.NxpeInformationContext;
import com.novell.nxpe.NxpeParameter;
import com.novell.nxpe.NxpeParameterList;
import com.novell.nxpe.NxpeResponseContext;
import com.novell.nxpe.NxpeResult;
```

The NxpeException class contains the defined constructors for throwing exceptions. For more information, see “Constructors in the NxpeException Class” on page 43.

The NxpeInformationContext class contains methods that allow you to gather information about extension evaluation.

The NxpeParameter class contains methods that allow you to retrieve information about a specific configuration parameter.
The NxpeParameterList class contains methods that allow you to retrieve information about the configuration parameters you have defined for the extension.

The NxpeResponseContext class contains methods that allow you to configure the information that is sent with the results, such as logging or trace entry.

The NxpeResult class contains the methods and constants to set the return value for the extension. For more information, see “Return Codes in the NxpeResult Class” on page 42.

**Task 2: Defining the Configuration Parameters**

If your extension requires configuration parameters, you need to define them. The following code snippet contains the parameters for the LDAP group extension. These are the name and ID values that are configured on the Extension Details page (Policies > Extensions > [Extension Name]).

```java
private static final String USER_STORE_NAME = "User Store";
private static final int EV_USER_STORE = 11;

private static final String AUTHENTICATION_NAME = "Authentication";
private static final int EV_AUTHENTICATION = 211;
private static final String DEFAULT_AUTHENTICATION = "simple";

private static final String DIRECTORY_TYPE_NAME = "Directory Type";
private static final int EV_DIRECTORY_TYPE = 222;
private static final String DEFAULT_DIRECTORY_TYPE = "unknown";

private static final String PROVIDER_URL_NAME = "User Store Replica";
private static final int EV_PROVIDER_URL = 31;
private static final String DEFAULT_PROVIDER_URL = "ldap://localhost:389";

private static final String LDAP_USER_DN_NAME = "LDAP User DN";
private static final int EV_LDAP_USER_DN = 41;

private static final String SECURITY_PRINCIPAL_NAME = "Security Principal";
private static final int EV_SECURITY_PRINCIPAL = 51;

private static final String SECURITY_CREDENTIALS_NAME = "Security Credentials";
private static final int EV_SECURITY_CREDENTIALS = 52;

private static final String SEARCH_CONTEXT_NAME = "Search Context";
private static final int EV_SEARCH_CONTEXT = 61;

private static final String DEBUG_NAME = "Debug";
private static final int EV_DEBUG = 91;
```

Not all of the parameters need to be defined in the Administration Console. If you want the administrator to decide the value that is mapped to the parameter, then you need to document the parameter and let the administrator select the mapping.

This is also a good place to define any other static constants your extension needs.

**Task 3: Retrieving Configuration Parameters before Policy Evaluation**

If your extension needs to be aware of some parameter values before it is called during policy evaluation, you can retrieve the values during the initialize method. Each extension interface (NxpeAction, NxpeCondition, NxpeContextDataElement) has an initialize method that contains a configurationValues object. The following code snippet illustrates what the LDAP group extension defines for this method. The setDebug line shows how to obtain the current value for the debug parameter.
public void initialize(
    NxpeParameterList configurationValues)
throws NxpeException {
    this.configurationValues = configurationValues;
    setDebug(configurationValues);
    strProviderURL = DEFAULT_PROVIDER_URL;
    strAuthentication = DEFAULT_AUTHENTICATION;
    strDirectoryType = DEFAULT_DIRECTORY_TYPE;
    StringBuffer sbLdapFilter = new StringBuffer(128);
    // setup filter
    sbLdapFilter.append("(|(objectClass=");
    sbLdapFilter.append(CLS_GROUP);
    sbLdapFilter.append(")(objectClass=");
    sbLdapFilter.append(CLS_GROUPOFNAMES);
    sbLdapFilter.append(")(objectClass=");
    sbLdapFilter.append(CLS_GROUPOFUNIQUENAMES);
    sbLdapFilter.append("))");
    strLdapFilter = new String(sbLdapFilter);
    // setup search controls
    searchControls = new SearchControls();
    searchControls.setTimeLimit(0);
    searchControls.setReturningObjFlag(true);
    searchControls.setSearchScope(SearchControls.SUBTREE_SCOPE);
    searchControls.setReturningAttributes(new String[] { ATTR_CN });
}

**Task 4: Implementing the Extension Methods**

Besides having an initialize method, each extension interface has a few other methods that need to be implemented. The NxpeContextDataElement interface has four get methods. The following code snippet illustrates how the LDAP Group extension implements three of these methods.

```java
public int getEnumerativeValue()
{
    return (iEnumerativeValue);
}

public String getName()
{
    return (strName);
}

public String getParameter()
{
    return (strParameter);
}
```

The fourth method (the getValue method) is described in the next section. See “Task 5: Retrieving Configuration Parameters at Policy Evaluation” on page 47.

**Task 5: Retrieving Configuration Parameters at Policy Evaluation**

All extension interfaces have a method for retrieving configuration parameters at policy evaluation. The NxpeCondition interface has an evaluate method with an informationContext object. The NxpeAction interface has a doAction method with a informationCxt object. The NxpeContextDataElement interface has a getValue method with an informationContext object. The
informationContext object contains information about the user and the user’s request that you need. You populate this object with the parameters that you need to evaluate the policy, and the policy engine supplies the values.

The following code snippet illustrates how the LDAP Group extension retrieves parameter values:

```java
public synchronized Object getValue(
    NxpeInformationContext informationContext,
    NxpeResponseContext responseContext)
throws NxpeException
{
    LdapContext ldapContext = null;
    String strUserStore = getUserStore(informationContext);
    String strProviderURL = getProviderURL(informationContext);
    String strAuthentication = getAuthentication(informationContext);
    String strDirectoryType = getDirectoryType(informationContext);
    String strLDAPUserDN = getLDAPUserDN(informationContext);
    String strDN = getSecurityPrincipal(informationContext);
    if (strLDAPUserDN == null)
    {
        strLDAPUserDN = strDN;
    }
    String strPassword = getSecurityCredentials(informationContext);
    String strSearchContext = getSearchContext(informationContext);
    String strLDAPUserDN = getLDAPUserDN(informationContext);
    String strDN = getSecurityPrincipal(informationContext);
    try
    {
        HashSet<String> groupDNs = new HashSet<String>();
        ldapContext = newInitialLdapContext(strDN, strPassword);
        NamingEnumeration neGroups = ldapContext.search(strSearchContext,
                strLdapMemberFilter, searchControls);
    }
    This piece of code is very specific to LDAP.

    Task 7: Returning from an Extension

    The following code snippet from the LDAP Group extension illustrates the tasks you need to complete as you return the results of your extension action/evaluation to the policy engine:
```
while (neGroups.hasMore())
{
    Attribute cn;
    SearchResult srGroup = (SearchResult) neGroups.next();
    String strGroupDN = srGroup.getNameInNamespace();
    groupDNs.add(strGroupDN);
    if (debug)
    {
        System.out.println("LDAPGroupDataElement: \\\"
            + strGroupDN + \\
            \\
        ");
    }
}

String[] strGroupDNs = new String[groupDNs.size()];
    
    groupDNs.toArray(strGroupDNs);
return (strGroupDNs);

This code searches through the LDAP search results, retrieves the DN of any group found, adds it to the array, then returns the array.

This task is specific to the purpose of the extension. If the purpose of the extension is to evaluate a condition and determine whether the user matches the condition, the code for this task should show the extension obtaining the user's value for the condition, comparing that value to the expected value, then return True for a match, False for a mismatch, and Error if extension cannot perform the evaluation.

**Task 8: Error Handling**

Each extension must handle potential error conditions. The following lines illustrate how the LDAP Group extension handles potential errors:

```java
try { 
    throw new NxpeException(NxpeResult.ErrorDataUnavailable, e));
} finally 
{
    if (ldapContext != null) 
    { 
        try 
        {
            ldapContext.close();
        } catch (NamingException e) 
        {
            if (debug) 
            { 
                System.out.println(e.getMessage());
            }
        }
    }
}
```
Task 9: Performing Extension-Specific Tasks

After your extension has implemented all the required interface methods, the rest of the code implements what the extension requires to perform its purpose. Everything that follows the comment in the LDAPGroupDataElement.java file shows how the LDAP Group extension performs its required tasks. For example, you can see how the extension retrieves parameter information from the policy engine, such as the user’s DN, security credentials, and user store information. With this information the extension interacts with the LDAP user store and retrieves the groups the user belongs to.

4.3 Creating an Extension

You can create the following types of extensions:

- Section 4.3.1, “Creating a Context Data Extension,” on page 50
- Section 4.3.2, “Creating a Condition Extension,” on page 54
- Section 4.3.3, “Creating an Action Extension,” on page 57

4.3.1 Creating a Context Data Extension

A context data extension can be used for a Role policy, an Authorization policy, an Identity Injection policy, or an External Attribute Source policy. When the extension is used for an Authorization policy, it can only be used to evaluate a condition. When it is used for a Role policy, it can be designed to do the following:

- A condition to determine whether the user meets the requirements for a role assignment
- An action for activating roles based on the values returned by the extension.

When the extension is used for an Identity Injection policy, it injects data into the Authentication header, the custom header, or the query string.

The following sections describe the interfaces, methods, and configuration parameters available for a context data extension:

- “Context Data Interfaces and Methods” on page 50
- “Available Configuration Parameters for a Data Context Extension” on page 51

For sample code for this type of extension, see the LDAPGroupDataElement.java and LDAPGroupDataElementFactory.java file.

Context Data Interfaces and Methods

When creating a context data element extension, you need to implement the following interfaces and methods:

<table>
<thead>
<tr>
<th>Interface</th>
<th>Method</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>NxpeContextDataElementFactory</td>
<td>getInstance</td>
<td>Creates the NxpeContextDataElement object.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When you configure a condition in a policy in the Administration Console, you select a condition and a value. The condition sets up the left operand for the comparison and the value sets up the right operand for the comparison.

**Available Configuration Parameters for a Data Context Extension**

You can use any of the data items listed in the Table 4.x to create configuration parameters that allow you to retrieve information about the request and the user making the request. Select the parameters that are useful for your extension. Many of the available data items might not be useful for your implementation.

- Table 4-1, “Configuration Parameters for a Role Policy,” on page 51
- Table 4-2, “Configuration Parameters for an Identity Injection Policy,” on page 52
- Table 4-3, “Configuration Parameters for an Authorization Policy,” on page 53
- Table 4-4, “Configuration Parameters for an External Attribute Source Policy,” on page 53

**Table 4-1 Configuration Parameters for a Role Policy**

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication IDP</td>
<td>The name of the Identity Server that authenticated the user.</td>
</tr>
<tr>
<td>Authenticating Contact</td>
<td>The URI of the contract that the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Method</td>
<td>The name of the method the user used for authentication.</td>
</tr>
</tbody>
</table>
### Table 4-2 Configuration Parameters for an Identity Injection Policy

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication Type</td>
<td>The type of authentication the user used, such as Name Password, Secure Name Password, x509, Smart Card, Smart Card PKI, and Token.</td>
</tr>
<tr>
<td>Credential Profile</td>
<td>The credentials the user used for authentication, such as LDAP Credentials (CN, DN, and password), X509 Credentials (with certificate subject, with certificate issuer, with public certificate, and with serial number), and SAML Credentials. If a custom contract has been created that uses other credentials for authentication, these credentials aren't available within the credential profile.</td>
</tr>
<tr>
<td>LDAP Group</td>
<td>The DNs of any LDAP groups the user belongs to. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>LDAP OU</td>
<td>The DNs of any OUs that are part of the user’s DN. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>LDAP Attribute</td>
<td>The value or values stored in the specified LDAP attribute. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>Liberty User Profile</td>
<td>The value or values stored in the specified Liberty User Profile attribute.</td>
</tr>
<tr>
<td>Roles from Identity Provider</td>
<td>The names of the Roles assigned to the user by the Identity Server when the user authenticated. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>User Store</td>
<td>The name of the user store that authenticated the user.</td>
</tr>
<tr>
<td>User Store Replica</td>
<td>The URL of the replica that authenticated the user.</td>
</tr>
<tr>
<td>String Constant</td>
<td>The static value the administrator has been instructed to enter.</td>
</tr>
<tr>
<td>Authenticating Contact</td>
<td>The URI of the contract that the user used for authentication.</td>
</tr>
<tr>
<td>Client IP</td>
<td>The IP address of the user.</td>
</tr>
<tr>
<td>Credential Profile</td>
<td>The credentials the user used for authentication, such as LDAP Credentials (CN, DN, and password), X509 Credentials (with certificate subject, with certificate issuer, with public certificate, and with serial number), and SAML Credentials. If a custom contract has been created that uses other credentials for authentication, these credentials aren't available within the credential profile.</td>
</tr>
<tr>
<td>LDAP Attribute</td>
<td>The value or values stored in the specified LDAP attribute. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>Liberty User Profile</td>
<td>The value or values stored in the specified Liberty User Profile attribute.</td>
</tr>
<tr>
<td>Proxy Session Cookie</td>
<td>The session cookie associated with the user.</td>
</tr>
<tr>
<td>Roles</td>
<td>The roles that have been assigned to the user</td>
</tr>
<tr>
<td>Shared Secret</td>
<td>The value of the specified shared secret.</td>
</tr>
<tr>
<td>String Constant</td>
<td>The static value the administrator has been instructed to enter.</td>
</tr>
</tbody>
</table>
Table 4-3 Configuration Parameters for an Authorization Policy

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication Contract</td>
<td>The URI of the contract used for authentication or the URI of the specified contract.</td>
</tr>
<tr>
<td>Client IP</td>
<td>The IP address of the user.</td>
</tr>
<tr>
<td>Credential Profile</td>
<td>The credentials of the user. You can ask for LDAP credentials (username, DN, and password), X.509 credentials (public certificate subject, public certificate issuer, public certificate, serial number), or the SAML assertion.</td>
</tr>
<tr>
<td>Current Date</td>
<td>The date when the request was sent.</td>
</tr>
<tr>
<td>Day of Week</td>
<td>The day when the request was sent.</td>
</tr>
<tr>
<td>Current Day of Month</td>
<td>The day of the month when the request was sent.</td>
</tr>
<tr>
<td>Current Time of Day</td>
<td>The time of day when the request was sent.</td>
</tr>
<tr>
<td>HTTP Request Method</td>
<td>The HTTP method in the request.</td>
</tr>
<tr>
<td>LDAP Attribute</td>
<td>The value of the specified LDAP attribute.</td>
</tr>
<tr>
<td>LDAP OU</td>
<td>The value of any OUs in the user's DN.</td>
</tr>
<tr>
<td>Liberty User Profile</td>
<td>The value of the specified Liberty attribute.</td>
</tr>
<tr>
<td>Roles</td>
<td>The roles that have been assigned to the user.</td>
</tr>
<tr>
<td>URL</td>
<td>The URL of the current request.</td>
</tr>
<tr>
<td>URL Scheme</td>
<td>The HTTP scheme (HTTP or HTTPS) of the current request.</td>
</tr>
<tr>
<td>URL Host</td>
<td>The hostname specified in the URL of the current request.</td>
</tr>
<tr>
<td>URL Path</td>
<td>The path specified in the URL of the current request.</td>
</tr>
<tr>
<td>URL File Name</td>
<td>The filename specified in the URL of the current request.</td>
</tr>
<tr>
<td>URL File Extension</td>
<td>The file extension specified in the URL of the current request.</td>
</tr>
<tr>
<td>X-Forwarded-For IP</td>
<td>The value in the X-Forwarded-For header in the current request.</td>
</tr>
<tr>
<td>String Constant</td>
<td>The static value the administrator has been instructed to enter.</td>
</tr>
<tr>
<td>Authentication IDP</td>
<td>The name of the Identity Server that authenticated the user.</td>
</tr>
<tr>
<td>Authenticating Contact</td>
<td>The URI of the contract that the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Method</td>
<td>The name of the method the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Type</td>
<td>The type of authentication the user used, such as Name Password, Secure Name Password, x509, Smart Card, Smart Card PKI, and Token.</td>
</tr>
</tbody>
</table>

Table 4-4 Configuration Parameters for an External Attribute Source Policy

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication IDP</td>
<td>The name of the Identity Server that authenticated the user.</td>
</tr>
<tr>
<td>Authenticating Contact</td>
<td>The URI of the contract that the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Method</td>
<td>The name of the method the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Type</td>
<td>The type of authentication the user used, such as Name Password, Secure Name Password, x509, Smart Card, Smart Card PKI, and Token.</td>
</tr>
</tbody>
</table>
A condition extension can be used in a Role policy or an Authorization policy. In both types of policy, the policy engine provides the extension with some data about the user and the request. The extension retrieves additional data from an external source, then evaluates the condition. The extension returns True, False, or Error to the policy engine.

The following sections describe the interfaces, methods, and configuration parameters available for a condition extension.

- “Interfaces and Methods for a Condition Extension” on page 54
- “Available Configuration Parameters for a Condition Extension” on page 55

### Interfaces and Methods for a Condition Extension

When creating a condition extension, you need to implement the following interfaces and methods:

<table>
<thead>
<tr>
<th>Interface</th>
<th>Method</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>NxpeConditionFactory</td>
<td>getInstance</td>
<td>Creates the NxpeCondition object.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contains the method required to create a condition object.</td>
</tr>
<tr>
<td>NxpeCondition</td>
<td></td>
<td>Contains the methods required to evaluate the condition for a policy.</td>
</tr>
</tbody>
</table>
Available Configuration Parameters for a Condition Extension

You can use the configuration parameters to gather information about the user. You can then use this information when evaluating your condition and use it to determine whether the condition should return True or False. The available configuration parameters depend upon whether it is a condition for a Role policy or a condition for a Authorization policy. Select the parameters that are useful for your extension. Many of the available data items might not be useful for your implementation.

- Table 4-5, “Configuration Parameters for a Role Condition,” on page 55
- Table 4-6, “Configuration Parameters for an Authorization Condition,” on page 56

**Table 4-5 Configuration Parameters for a Role Condition**

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication IDP</td>
<td>The name of the Identity Server that authenticated the user.</td>
</tr>
<tr>
<td>Authenticating Contact</td>
<td>The URI of the contract that the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Method</td>
<td>The name of the method the user used for authentication.</td>
</tr>
<tr>
<td>Authentication Type</td>
<td>The type of authentication the user used, such as Name Password, Secure Name Password, x509, Smart Card, Smart Card PKI, and Token.</td>
</tr>
<tr>
<td>Credential Profile</td>
<td>The credentials the user used for authentication, such as LDAP Credentials (CN, DN, and password), X509 Credentials (with certificate subject, with certificate issuer, with public certificate, and with serial number), and SAML Credentials.</td>
</tr>
<tr>
<td>LDAP Group</td>
<td>The DNs of any LDAP groups the user belongs to. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>Data Item</td>
<td>Returns</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>LDAP OU</td>
<td>The DN of any OUs that are part of the user’s DN. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>LDAP Attribute</td>
<td>The value or values stored in the specified LDAP attribute. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>Liberty User Profile</td>
<td>The value or values stored in the specified Liberty User Profile attribute.</td>
</tr>
<tr>
<td>Roles from Identity Provider</td>
<td>The names of the Roles assigned to the user by the Identity Server when the user authenticated. If it is multi-valued, this item returns a string array.</td>
</tr>
<tr>
<td>User Store</td>
<td>The name of the user store that authenticated the user.</td>
</tr>
<tr>
<td>User Store Replica</td>
<td>The URL of the replica that authenticated the user.</td>
</tr>
<tr>
<td>String Constant</td>
<td>The static value the administrator has been instructed to enter.</td>
</tr>
</tbody>
</table>

**Table 4-6**  Configuration Parameters for an Authorization Condition

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication Contract</td>
<td>The URI of the contract used for authentication or the URI of the specified contract.</td>
</tr>
<tr>
<td>Client IP</td>
<td>The IP address of the user.</td>
</tr>
<tr>
<td>Credential Profile</td>
<td>The credentials of the user. You can ask for LDAP credentials (username, dn, and password), X.509 credentials (public certificate subject, public certificate issuer, public certificate, serial number), or the SAML assertion.</td>
</tr>
<tr>
<td>Current Date</td>
<td>The date when the request was sent.</td>
</tr>
<tr>
<td>Day of Week</td>
<td>The day when the request was sent.</td>
</tr>
<tr>
<td>Current Day of Month</td>
<td>The day of the month when the request was sent.</td>
</tr>
<tr>
<td>Current Time of Day</td>
<td>The time of day when the request was sent.</td>
</tr>
<tr>
<td>Destination IP</td>
<td>The destination IP address of the request.</td>
</tr>
<tr>
<td>HTTP Request Method</td>
<td>The HTTP method in the request.</td>
</tr>
<tr>
<td>LDAP Attribute</td>
<td>The value of the specified LDAP attribute.</td>
</tr>
<tr>
<td>LDAP OU</td>
<td>The value of any OUs in the user’s DN.</td>
</tr>
<tr>
<td>Liberty User Profile</td>
<td>The value of the specified Liberty attribute.</td>
</tr>
<tr>
<td>Roles</td>
<td>The roles that have been assigned to the user.</td>
</tr>
<tr>
<td>URL</td>
<td>The URL of the current request.</td>
</tr>
<tr>
<td>URL Scheme</td>
<td>The HTTP scheme (HTTP or HTTPS) of the current request.</td>
</tr>
<tr>
<td>URL Host</td>
<td>The hostname specified in the URL of the current request.</td>
</tr>
<tr>
<td>URL Path</td>
<td>The path specified in the URL of the current request.</td>
</tr>
</tbody>
</table>
4.3.3 Creating an Action Extension

There are the three types of actions: deny, permit, and obligation. The following sections describe the interfaces, methods, and configuration parameters available for an action extension.

- “Action Interfaces and Methods” on page 57
- “Actions” on page 58
- “Available Configuration Parameters for an Action Extension” on page 58

Action Interfaces and Methods

When creating an action extension, you need to implement the following interfaces and methods:

<table>
<thead>
<tr>
<th>Interface</th>
<th>Method</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>NxpeActionFactory</td>
<td>getInstance</td>
<td>Creates the NxpeAction object.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contains the methods required to create an action object.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Called by the policy engine and therefore must be implemented.</td>
</tr>
<tr>
<td></td>
<td>Initialize</td>
<td>It initializes the element and passes to your extension any configuration values you have requested. These parameters contain valid information only if the parameters contain information independent of the request that triggers policy evaluation. The data in the configurationValues parameter is valid only during the lifetime of the initialize method. If your extension needs to preserve this configuration data, you must maintain a reference.</td>
</tr>
<tr>
<td></td>
<td>doAction</td>
<td>Called by the policy engine when the action extension needs to be evaluated for a policy. The informationCtx parameter contains the parameter information the extension needs from the policy engine to evaluate the condition. The responseCtx parameter contains the results of the action.</td>
</tr>
<tr>
<td></td>
<td>setInterfaceId</td>
<td>Sets the unique string value for the action. This value is used for tracing the action during policy evaluation.</td>
</tr>
</tbody>
</table>
## Actions

A policy rule can have multiple obligation actions but only one terminating action of either permit or deny. A permit or deny action needs to return either success or failure to the policy engine. An obligation action can return either success or failure; the policy engine just needs the acknowledgement that the obligation extension has performed its action.

An extension that implements an obligation action can use the doAction method to enter a log or audit event in another system or send an email message.

An extension that implements a deny or permit action can use the doAction method to ask another database or policy to evaluate a condition and then return the results of that evaluation to the Access Manager policy engine.

### Available Configuration Parameters for an Action Extension

You can use any of the data items in the list to retrieve information about the user and the user's request to create a configuration parameter. Your extension can then use this information in determining the type of action to take. Select the parameters that are useful for your extension. Many of the available data items might not be useful for your implementation.

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication Contract</td>
<td>The URI of the contract used for authentication or the URI of the specified contract.</td>
</tr>
<tr>
<td>Client IP</td>
<td>The IP address of the user.</td>
</tr>
<tr>
<td>Credential Profile</td>
<td>The credentials of the user. You can ask for LDAP credentials (username, dn, and password), X.509 credentials (public certificate subject, public certificate issuer, public certificate, serial number), or the SAML assertion.</td>
</tr>
<tr>
<td>Current Date</td>
<td>The date when the request was sent.</td>
</tr>
<tr>
<td>Day of Week</td>
<td>The day when the request was sent.</td>
</tr>
<tr>
<td>Current Day of Month</td>
<td>The day of the month when the request was sent.</td>
</tr>
<tr>
<td>Current Time of Day</td>
<td>The time of day when the request was sent.</td>
</tr>
<tr>
<td>HTTP Request Method</td>
<td>The HTTP method in the request.</td>
</tr>
<tr>
<td>LDAP Attribute</td>
<td>The value of the specified LDAP attribute.</td>
</tr>
<tr>
<td>LDAP OU</td>
<td>The value of any OUs in the user’s DN.</td>
</tr>
<tr>
<td>Liberty User Profile</td>
<td>The value of the specified Liberty attribute.</td>
</tr>
<tr>
<td>Roles</td>
<td>The roles that have been assigned to the user.</td>
</tr>
<tr>
<td>URL</td>
<td>The URL of the current request.</td>
</tr>
<tr>
<td>URL Scheme</td>
<td>The HTTP scheme (HTTP or HTTPS) of the current request.</td>
</tr>
<tr>
<td>URL Host</td>
<td>The hostname specified in the URL of the current request.</td>
</tr>
<tr>
<td>URL Path</td>
<td>The path specified in the URL of the current request.</td>
</tr>
</tbody>
</table>
4.4 Installing and Configuring an Extension

After you have created your extension, you need to install it, configure it, and distribute it.

- Section 4.4.1, “Installing the Extension on the Administration Console,” on page 59
- Section 4.4.2, “Distributing a Policy Extension to Access Manager Devices,” on page 61
- Section 4.4.3, “Distributing the Extension to Customers,” on page 62

4.4.1 Installing the Extension on the Administration Console

To install an extension, you need to have access to the JAR file and know the following information about the extension or extensions contained within the file.

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>URL File Name</td>
<td>The filename specified in the URL of the current request.</td>
</tr>
<tr>
<td>URL File Extension</td>
<td>The file extension specified in the URL of the current request.</td>
</tr>
<tr>
<td>X-Forwarded-For IP</td>
<td>The value in the X-Forwarded-For header in the current request.</td>
</tr>
<tr>
<td>String Constant</td>
<td>The static value the administrator has been instructed to enter.</td>
</tr>
</tbody>
</table>

What you need to create

- A display name for the extension.
- A description for the extension.

What you need to know

- The policy type of the extension, which defines the policy type it can be used with. You should know whether it is an extension for an Access Gateway Authorization policy, an Access Gateway Identity Injection policy, or an Identity Server Role policy.
- The name of the Java class that is used by the extension. Each data type usually uses a different Java factory class.
- The filename of the extension.
The type of data the extension manipulates.

**Authorization Policy:** Can be used to return:
- An action of deny, permit, or obligation.
- A condition that the extension evaluates and returns either true or false.
- A data element that the extension retrieves and the policy can use for evaluating a condition.

**Identity Injection Policy:** A data extension that retrieves data for injecting into a header.

**Identity Role Policy:** Can be used to return:
- A condition that the extension evaluates and returns either true or false
- A data element that the extension retrieves, which can be used in evaluating a condition or used to assign roles

**External Attribute Source Policy:** You can use it to:
- Get attributes from the external sources.
- Create shared secrets. This shared secret then can be used in configuring other policies or can be used by the Identity Servers in their attribute sets.

The names, IDs, and mapping type of any configuration parameters. Configuration parameters allow the policy engine to pass data to the extension, which the extension can then use to retrieve data or as part of its evaluation.

If the file contains more than one extension, you need to create a configuration for each extension in the file.

1. Copy the JAR file to a location that you can browse to from the Administration Console.
2. In the Administration Console, click Policies > Extensions.
3. To upload the file, click Upload > Browse, select the file, then click Open.
4. (Conditional) If you want this JAR file to overwrite an existing version of the file, select Overwrite existing *.jar file.
5. Click OK.

The file is uploaded to the Administration Console, but nothing is visible on the Extensions page until you create a configuration.

6. To create an extension configuration, click New, then fill in the following fields:
   - **Name:** Specify a display name for the extension.
   - **Description:** (Optional) Specify the purpose of the extension and how it should be used.
   - **Policy Type:** From the drop-down list, select the type of extension you have uploaded.
   - **Type:** From the drop-down list, select the data type of the extension.
   - **Class Name:** Specify the name of the class that creates the extension, for example com.acme.policy.action.successActionFactory.
File Name: From the drop-down list, select the JAR file that contains the Java class that implements the extension and its corresponding factory. This should be the file you uploaded in Step 3.

7 Click OK.

8 (Conditional) If the extension requires data from Access Manager, click the name of the extension.

9 In the Configuration Parameters section, click New, specify a name and ID, then click OK. The developer of the extension must supply the name and ID that the extension requires.

10 In the Mapping column, click the down-arrow, then select the required data type.

The developer of the extension must supply the data type that is required. If the data type is a data string, then the developer needs to explain the type of information you need to supply in the text field.

11 (Conditional) If the extension requires more than one data item, repeat Step 9 and Step 10.

12 Click OK.

The extension is now available for the policy type it was created for.

13 (Conditional) If the class can be used for multiple policy types, you need to create an extension configuration for each policy type.

For example, if an extension can be used for both an Identity Injection policy and a Role policy, you need to create an entry for both. The File Name option should contain the same value, but the other options should contain unique values.

14 Continue with Section 4.4.2, “Distributing a Policy Extension to Access Manager Devices,” on page 61.

### 4.4.2 Distributing a Policy Extension to Access Manager Devices

To distribute the policy extension to the devices that need it:

1 Create a Role, Identity Injection, or Authorization policy that uses the extension.

2 Assign the policy to a device:
   - For a Role policy, enable it for an Identity Server.
   - For an Authorization policy, assign it to a protected resource.
   - For an Identity Injection policy, assign it to a protected resource.

**IMPORTANT:** Do not update the device at this time. The JAR files must be distributed before you update the device.

3 Distribute the JAR files:
   3a Click Policies > Extensions.
   3b Select the extension, then click Distribute JARs.
   3c Restart services on the devices listed for reboot.
      - **Linux:** Enter the following command:
         
         \[
         \text{Identity Server: /etc/init.d/novell-idp restart} \\
         \text{Access Gateway: /etc/init.d/novell-mag restart} \\
         \]
      
      - **Windows:** Enter the following commands:
         
         ```
         net stop Tomcat7 \\
         net start Tomcat7
         ```
4 (Conditional) If the extension is for an Authorization policy or an Identity Injection policy, update the Access Gateway.

5 (Conditional) If the extension is for a Role policy, update the Identity Server.

### 4.4.3 Distributing the Extension to Customers

You can distribute the extension as either a JAR file or as a ZIP file. If the extension contains multiple types of extensions or contains multiple configuration parameters, you might want to consider distributing the extension as a ZIP file.

You need to import your JAR file and configure it as described in Section 4.4.1, “Installing the Extension on the Administration Console,” on page 59. After it has been configured, you can select to export it as a ZIP file. Your users can then import the ZIP file, and each extension type you have created is imported with its configuration parameters. In the documentation you create for the extension, you need to document any parameter the user needs to modify after the import.

To export an extension:

1. In the Administration Console, click Policies > Extensions.
2. Select all the extensions that are part of your JAR file.
   
   If you have more than one JAR file, you can select the extensions that belong to it and include them in the same export.
3. Click Export, specify a name for the file, then click OK.
4. Follow your browser prompts to save the file to disk.

### 4.5 Sample Codes

You can find the sample codes for the following extensions in novell-nacm3_2.tar.gz on the NetIQ Access Manager Developer Tools and Examples page.

For more information, see NetIQ Access Manager 3.2 - Sample Code.

- Section 4.5.1, “Data Extension for External Attribute Source Policy,” on page 62
- Section 4.5.2, “Template Policy Extensions,” on page 63
- Section 4.5.3, “LDAP Group Data Element,” on page 63
- Section 4.5.4, “PasswordClass,” on page 63

#### 4.5.1 Data Extension for External Attribute Source Policy

This example demonstrates how an External Attribute Source policy retrieves information from external sources. It provides details about:

- How to configure and install the External Attribute Source Data policy extension in the Administration Console.
- Implementation details of the extension factory and extension classes.
- How to use the information retrieved from the External Attribute Source policies as shared secret. It also explains how to use that shared secret to configure other policies or use them in the Identity servers to retrieve attributes from external sources.

The policy extension example includes NameAttributeFromMailIDFactory.java and NameAttributeFromMailID.java.
4.5.2 Template Policy Extensions

This includes the following two types:

- Template Condition Policy
- Template Data Policy

Template Condition Policy

You can use this example as a template to implement a policy extension of type `Condition` that is `com.novell.nxpe.NxpeCondition`. This example provides a basic framework that can be used as a starting point for creating data policy (`com.novell.nxpe.NxpeContextDataElement`.) extensions. It provides details about:

- How to configure and install a `Condition` policy extension in the Administration Console.
- Implementation details of the extension factory and extension classes.

The policy extension example includes `PolicyConditionExtnFactoryTemplate.java` and `PolicyConditionExtnTemplate.java`.

Template Data Policy

You can use this example as a template to implement a policy extension of type `Data` that is `com.novell.nxpe.NxpeContextDataElement`. This example provides a basic framework that can be used as a starting point for creating such policy extensions. It provides details about:

- How to configure and install the Data policy extension in the Administration Console.
- Implementation details of the extension factory and extension classes.

The policy extension example includes `PolicyDataExtnFactoryTemplate.java` and `PolicyDataExtnTemplate.java`.

4.5.3 LDAP Group Data Element

This example illustrates how a policy extension can use external data sources to obtain information. This policy extension connects to the required LDAP repository, runs a search on it, and returns the results. An Identity Injection policy is created in this example that uses this policy extension.

The policy extension example includes `LDAPGroupDataElement.java` and `LDAPGroupDataElementFactory.java`.

4.5.4 PasswordClass

This authentication class extends the base class `LocalAuthenticationClass` and performs a form based authentication. The policy extension example includes `passwordClass.java`.

For more information, see Section 2.4, “Understanding the Authentication Class Example,” on page 21 and Section 2.6, “Deploying Your Authentication Class,” on page 26.
Revisions

This section outlines all the changes that have been made to the Access Manager SDK documentation (in reverse chronological order).

<table>
<thead>
<tr>
<th>Date</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 2012</td>
<td>Made the following changes in LDAP Server Plug-in:</td>
</tr>
<tr>
<td></td>
<td>• Changed the code under section 3.3 Directory Plug-In.</td>
</tr>
<tr>
<td></td>
<td>• Replaced <code>nidp.jar</code> with <code>NAMCommon.jar</code>.</td>
</tr>
<tr>
<td></td>
<td>• Replaced <code>com.novell.nidp.common.authority.ldap.jndi.LDAPStorePlugin</code> with <code>com.novell.nam.common.ldap.jndi.LDAPStorePlugin</code>.</td>
</tr>
<tr>
<td></td>
<td>Added table 4-4 Configuration Parameters for an External Attribute Source Policy</td>
</tr>
<tr>
<td></td>
<td>Added the 'External Attribute Source Policy' references in sections 4.1.2, 4.3.1, and 4.4.1.</td>
</tr>
<tr>
<td></td>
<td>Added a new section: 4.5 Sample Codes.</td>
</tr>
<tr>
<td></td>
<td>Fixed broken links.</td>
</tr>
<tr>
<td></td>
<td>Changed the template to NetIQ.</td>
</tr>
<tr>
<td>February 2012</td>
<td>Removed Appendix A, “Identity Injection Java Plug-In. This API has been deprecated. Modified the tomcat paths for Linux and added paths for Windows.</td>
</tr>
<tr>
<td>November 2009</td>
<td>Removed two unsupported LocalClassAuthentication methods (showErrorJSP and getIdPProviders) from the manual.</td>
</tr>
<tr>
<td>March 2009</td>
<td>Split the SDK into two SDKs, one for Access Manager 3.0.4 and one for Access Manager 3.1.</td>
</tr>
<tr>
<td>January 2009</td>
<td>Added information on how to use the policy extension API. This new feature is only available in Access Manager 3.1. For more information, see Chapter 4, “The Policy Extension API,” on page 37.</td>
</tr>
<tr>
<td></td>
<td>Deprecated the Identity Injection Java Plug-In interface (Appendix A, “Identity Injection Java Plug-In”). It has been replaced by the policy extension API in Access Manager 3.1.</td>
</tr>
<tr>
<td>July 2008</td>
<td>Added information about the LDAP server plug-in that you can create to extend the directory types that the Identity Server supports for user stores. See Chapter 3, “LDAP Server Plug-In,” on page 29.</td>
</tr>
<tr>
<td>April 2008</td>
<td>Added information about the doAuthenticate() method that was added in Access Manager 3.0 SP3 and takes advantage of secret store unlocking. See Section 2.3.2, “The doAuthenticate Method,” on page 11.</td>
</tr>
<tr>
<td>Date</td>
<td>Details</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>October 10, 2007</td>
<td>Added information about additional methods and grouped the methods. Added information about localizing an authentication class. See Chapter 2, &quot;Identity Server Authentication API,&quot; on page 9. Added a section on how to design a plug-in. (Section A.4, “Designing the Plug-In.”).</td>
</tr>
<tr>
<td>December 6, 2006</td>
<td>Added the component to the Novell Developer Kit as an Early Access (unsupported) document.</td>
</tr>
</tbody>
</table>