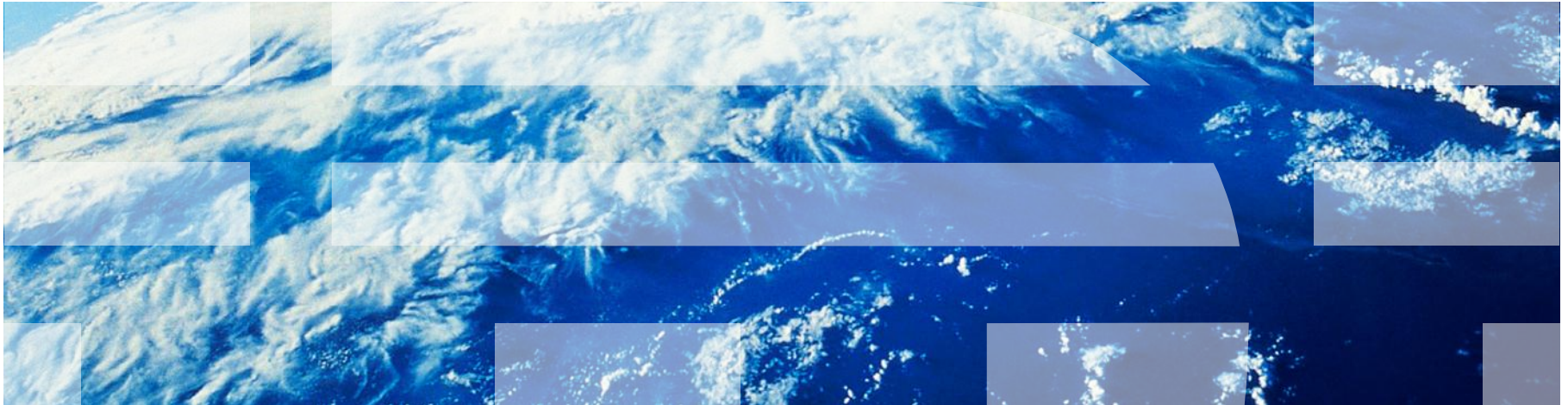


IBM Worklight Foundation V6.2.0 Getting Started

Custom authenticator and login module in hybrid applications



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Agenda

- Introduction to authentication
- Configuring the authenticationConfig.xml file
- Creating a custom Java authenticator
- Creating a custom Java login module
- Creating client-side authentication components
- Examining the result

Introduction to authentication (1 of 3)

- The authentication process can be interactive:
 - For example, user name and password
- Or non-interactive:
 - For example, header-based authentication
- This process can involve a single step/
 - For example, a simple user name/password form)
- Or multiple steps/
 - For example, it might have to add a challenge after it issued the first passwordS.
- The definition of the authentication realm includes the class name of an authenticator and a reference to a login module.
- An authenticator is an entity that collects user information.
 - For example: a login form
- A login module is a server entity that validates the retrieved user credentials and builds the user identity.
- You configure authentication settings such as realms, authenticators, and login modules, in the `authenticationConfig.xml` file that comes with Worklight Server.

An unauthenticated user tries to access the resource that is protected by an authentication realm.

An *authenticator* is called to collect user credentials, that is, the user name and password.

The *Login module* receives the collected credentials and validates them.

If the supplied credentials pass validation, the Login Module creates the *User Identity* object and flags the session as authenticated in a specified realm.

Introduction to authentication (2 of 3)

- The authenticator, login module, and user identity instances are stored in a session scope. Therefore they exist while the session is alive.
- You can write custom login modules and authenticators when the default ones do not match your requirements.
- In previous modules:
 - You implemented a form-based authentication and used a non-validating login module.
 - You implemented an adapter-based authentication without having to add login modules, and ran credentials validation manually.
- In some cases, when credentials validation cannot be run at adapter level and requires more complex code, you can implement an extra login module.
 - For example: When credentials validation must be customized for a specific enterprise; or when more information must be retrieved from each client request, such as cookie, header, and user-agent.

Introduction to authentication (3 of 3)

- This module explains how to create a custom authenticator and a login module:
 - You learn how to implement a custom authenticator that collects the user name and password by using a request to a predefined URL.
 - You learn how to implement a custom login module that checks credentials that are received from the authenticator.
 - You learn how to define a realm that uses your custom authenticator and login module.
 - You learn how to use this realm to protect resources.
- For more information about authentication concepts, see IBM® Worklight ® Foundation user documentation.

Agenda

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Configuring authenticationConfig.xml (1 of 2)

- Add authentication information to the **authenticationConfig.xml** file.
- In the `<realms>` section, define a realm called **CustomAuthenticatorRealm**.
 - Make sure that it uses **CustomLoginModule**.
- Specify **MyCustomAuthenticator** as the class name. You implement it in subsequent slides.

```
<realm name="CustomAuthenticatorRealm" loginModule="CustomLoginModule">  
  <className>com.mypackage.MyCustomAuthenticator</className>  
</realm>  
<realm name="SampleAppRealm" loginModule="StrongDummy">
```

- In the `<loginModules>` section, add a **loginModule** called **CustomLoginModule**.

```
<loginModule name="CustomLoginModule">  
  <className>com.mypackage.MyCustomLoginModule</className>  
</loginModule>
```

- Specify **MyCustomLoginModule** as the class name. You implement it in subsequent slides.

Configuring authenticationConfig.xml (2 of 2)

- In the `<securityTests>` section, add a security test.
- Later, you use this security test to protect the adapter procedure. Therefore, use a `<customSecurityTest>` element.

```
<securityTests>
  <customSecurityTest name="CustomAuthSecurityTest">
    <test isInternalUserID="true" realm="CustomAuthenticatorRealm"/>
  </customSecurityTest>
</securityTests>
```

- Remember the security test name because you will use in the next slides.

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Creating a custom Java™ authenticator (1 of 21)

- The authenticator API includes the following methods:
 - `void init(Map<String, String> options)`
 - `AuthenticationResult processRequest(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)`
 - `AuthenticationResult processAuthenticationFailure(HttpServletRequest request, HttpServletResponse response, AuthenticationMessage message)`
 - `AuthenticationResult processRequestAlreadyAuthenticated(HttpServletRequest request, HttpServletResponse response)`
 - `Map<String, Object> getAuthenticators(HttpServletRequest request)`
 - `HttpServletRequest getRequest(HttpServletRequest request, HttpServletResponse response, String userIdentity, LoginExtensionInfo info)`
 - `Boolean changeResponseOnSuccess(HttpServletRequest request, HttpServletResponse response)`
 - `WorkLightAuthenticator clone()`

The `init` method of the authenticator is called when the authenticator instance is created. It takes the parameters that are specified in the definition of the realm in the `authenticationConfig.xml` file.

Creating a custom Java authenticator (2 of 21)

- The authenticator API includes the following methods:
 - void **init**(Map<String, String> options)
 - AuthenticationResult **processRequest**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
 - AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response, String errorMessage)
 - AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
 - Map<String, Object> **getAuthenticators**(HttpServletRequest request)
 - HttpServletRequest **getRequest**(HttpServletRequest request, HttpServletResponse response, LoginExtension userIdentity, LoginExtension userSession)
 - Boolean **changeResponseOnSuccess**(HttpServletRequest request, HttpServletResponse response)
 - WorkLightAuthenticator **clone**()

The processRequest method is called for each request from an unauthenticated session.

Creating a custom Java authenticator (3 of 21)

- The authenticator API includes the following methods:
 - void **init**(Map<String, String> options)
 - AuthenticationResult **processRequest**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
 - AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response, String errorMessage)
 - AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
 - Map<String, Object> **getAuthenticators**(HttpServletRequest request)
 - HttpServletRequest **getRequest**(HttpServletRequest request, HttpServletResponse response, UserIdentity, LoginExtension)
 - Boolean **changeResponseOnSuccess**(HttpServletRequest request, HttpServletResponse response)
 - WorkLightAuthenticator **clone**(WorkLightAuthenticator authenticator)

The `processAuthenticationFailure` method is called if the login module returns a failure of credentials validation.

Creating a custom Java authenticator (4 of 21)

- The authenticator API includes the following methods:
 - void **init**(Map<String, String> options)
 - AuthenticationResult **processRequest**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
 - AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response, String errorMessage)
 - AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
 - Map<String, Object> **get...**
 - HttpServletRequest **get...**
request, HttpServletRequest
userIdentity, LoginExt...
 - Boolean **changeResponse...**
request, HttpServletRequest
 - WorkLightAuthenticator

The
`processRequestAlreadyAuthenticated`
method is called for each request from an
already authenticated session.

Creating a custom Java authenticator (5 of 21)

- The authenticator API includes the following methods:

- void **init**(Map<String, String> configuration)
- AuthenticationResult **process**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
- AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response)
- AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
- Map<String, Object> **getAuthenticationData**()
- HttpServletRequest **getRequestToProceed**(HttpServletRequest request, HttpServletResponse response, UserIdentity userIdentity, LoginExtension... loginExtension)
- Boolean **changeResponseOnSuccess**(HttpServletRequest request, HttpServletResponse response)
- WorkLightAuthenticator **clone**()

The `getAuthenticationData` method is used by a login module to get the credentials that are collected by an authenticator.

Creating a custom Java authenticator (6 of 21)

- The authenticator API includes the following methods:

- void **init**(Map<String, String> configuration)
- AuthenticationResult **process**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
- AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response, AuthenticationException exception)
- AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
- Map<String, Object> **getAuthenticationData**()
- HttpServletRequest **getRequestToProceed**(HttpServletRequest request, HttpServletResponse response, UserIdentity userIdentity, LoginExtension... loginExtension)
- Boolean **changeResponseOnSuccess**(HttpServletRequest request, HttpServletResponse response)
- WorkLightAuthenticator **clone**()

The `getRequestToProceed` method is called only after the login module successfully validates the credentials that were collected by an authenticator.

The `getRequestToProceed` method has been **deprecated** since IBM Worklight V5.0.0.3.

Creating a custom Java authenticator (7 of 21)

- The authenticator API includes the following methods:
 - void **init**(Map<String, String> configuration)
 - AuthenticationResult **process**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
 - AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response)
 - AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
 - Map<String, Object> **getAuthenticationData**()
 - HttpServletRequest **getRequestToProceed**(HttpServletRequest request, HttpServletResponse response, UserIdentity userIdentity, LoginExtension... loginExtension)
 - Boolean **changeResponseOnSuccess**(HttpServletRequest request, HttpServletResponse response)
 - WorkLightAuthenticator **clone**()

The `changeResponseOnSuccess` method is called after authentication success. It is used to add data to the response after the authentication is successful.

Creating a custom Java authenticator (8 of 21)

- The authenticator API includes the following methods:
 - void **init**(Map<String, String> configuration)
 - AuthenticationResult **process**(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource)
 - AuthenticationResult **processAuthenticationFailure**(HttpServletRequest request, HttpServletResponse response)
 - AuthenticationResult **processRequestAlreadyAuthenticated**(HttpServletRequest request, HttpServletResponse response)
 - Map<String, Object> **getAuthenticationData**()
 - HttpServletRequest **getRequestToProceed**(HttpServletRequest request, HttpServletResponse response, UserIdentity userIdentity, LoginExtension... loginExtension)
 - Boolean **changeResponseOnSuccess**(HttpServletRequest request, HttpServletResponse response)
 - WorkLightAuthenticator **clone**()

The `clone` method is used to create a deep copy of class members.

Creating a custom Java authenticator (9 of 21)

- Create a **MyCustomAuthenticator** class in the **server\java** folder.
- Make sure that this class implements the **WorkLightAuthenticator** interface.

```
public class MyCustomAuthenticator implements WorkLightAuthenticator {
```

- Add the **authenticationData** map to your authenticator to hold the credentials information.
 - This object is retrieved and used by a login module.

```
private Map<String, Object> authenticationData = null;
```

Creating a custom Java authenticator (10 of 21)

- You must add a dependency on server runtime libraries to use server-related classes, for example, **HttpServletRequest**.
- Right-click your Worklight project and select **Properties**.
- Select **Java Build Path** → **Libraries** and click **Add Library**.
- Select **Server Runtime** and click **Next**.
- You see a list of server runtimes that are installed in your Eclipse.
- Select one and click **Finish**.
- Click **OK**.

Creating a custom Java authenticator (11 of 21)

- The `init` method is called when the authenticator is created.
- As its parameter, this method takes the map of options that is specified in a realm definition in the **authenticationConfig.xml** file.

```
@Override
public void init(Map<String, String> options) throws MissingConfigurationException {
    logger.info("init");
}
```

- The `clone` method of the authenticator creates a deep copy of the object members.

```
@Override
public WorkLightAuthenticator clone() throws CloneNotSupportedException {
    MyCustomAuthenticator otherAuthenticator = (MyCustomAuthenticator) super.clone();
    otherAuthenticator.authenticationData = new HashMap<String, Object>(authenticationData);
    return otherAuthenticator;
}
```

Creating a custom Java authenticator (12 of 21)

- The `processRequest` method is called for each unauthenticated request to collect credentials.

```
@Override
public AuthenticationResult processRequest(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource) {
    Logger.info("myCustomAuthenticator :: processRequest");
    if (request.getRequestURI().contains("my_custom_auth_request_url")){
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password) {
            authenticationData = new HashMap<String, String>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(authenticationData);
        } else {
            response.setContentType("application/json");
            response.setHeader("Cache-Control", "no-cache");
            response.getWriter().print("{\"authStatus\": \"invalid\"}");
            return AuthenticationResult.createFrom(authenticationData);
        }
    }

    if (!isAccessToProtectedResource)
        return AuthenticationResult.createFrom(authenticationData);

    response.setContentType("application/json");
    response.setHeader("Cache-Control", "no-cache");
    response.getWriter().print("{\"authStatus\": \"invalid\"}");
    return AuthenticationResult.createFrom(authenticationData);
}
```

The `processRequest()` method takes the request, response, and `isAccessToProtectedResource` arguments. The method might retrieve data from a request and write data to a response, and must return a specific `AuthenticationResult` status as described in subsequent slides.

Reminder: the authenticator collects the credentials for a login module; it **does not** validate them.

Creating a custom Java authenticator (13 of 21)

- The `processRequest` method is called for each unauthenticated request to collect credentials.

```
@Override
public AuthenticationResult processRequest(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource) {
    logger.info("MyCustomAuthenticator :: processRequest");
    if (request.getRequestURI().contains("my_custom_auth_request_url")){
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password && username.length() > 0 && password.length() > 0){
            authenticationData = new HashMap<String, Object>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS, authenticationData);
        } else {
            response.setContentType("application/json; charset=UTF-8");
            response.setHeader("Cache-Control", "no-cache, must-revalidate");
            response.getWriter().print("{\"authStatus\":\"required\"}");
            return AuthenticationResult.createFrom(AuthenticationStatus.REQUIRED);
        }
    }

    if (!isAccessToProtectedResource)
        return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS);

    response.setContentType("application/json; charset=UTF-8");
    response.setHeader("Cache-Control", "no-cache, must-revalidate");
    response.getWriter().print("{\"authStatus\":\"required\"}");
    return AuthenticationResult.createFrom(AuthenticationStatus.REQUIRED);
}
```

The application sends an authentication request to a specific URL. This request URL contains a `my_custom_auth_request_url` component, which is used by the authenticator to make sure that this request is an authentication request. It is recommended to have a different URL component in every authenticator.

Creating a custom Java authenticator (14 of 21)

- The `processRequest` method is called for each unauthenticated request to collect credentials.

```
@Override
public AuthenticationResult processRequest(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource) {
    Logger.info("MyCustomAuthenticator :: processRequest");
    if (request.getRequestURL().contains("my_custom_auth_request_url")){
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password && username.length() > 0 && password.length() > 0){
            authenticationData = new HashMap<String, Object>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS);
        } else {
            response.setContentType("application/json; charset=UTF-8");
            response.setHeader("Cache-Control", "no-cache, must-revalidate");
            response.getWriter().print("{\"authStatus\":\"required\", \"password\":\"\"}");
            return AuthenticationResult.createFrom(AuthenticationStatus.REQUIRED);
        }
    }

    if (!isAccessToProtectedResource)
        return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_ERROR);

    response.setContentType("application/json; charset=UTF-8");
    response.setHeader("Cache-Control", "no-cache, must-revalidate");
    response.getWriter().print("{\"authStatus\":\"required\"}");
    return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_ERROR);
}
```

The authenticator retrieves the user name and password that are passed as request parameters.

Creating a custom Java authenticator (15 of 21)

- The `processRequest` method is called for each unauthenticated request to collect credentials.

```

@Override
public AuthenticationResult processRequest(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource) {
    Logger.info("MyCustomAuthenticator :: processRequest");
    if (request.getRequestURI().contains("my_custom_auth_request_url")){
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password && username.length() > 0 && password.length() > 0){
            authenticationData = new HashMap<String, Object>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS);
        } else {
            response.setContentType("application/json; charset=UTF-8");
            response.setHeader("Cache-Control", "no-cache, must-revalidate");
            response.getWriter().print("{\"authStatus\":\"required\"}");
            return AuthenticationResult.createFrom(AuthenticationStatus.REQUIRED);
        }
    }

    if (!isAccessToProtectedResource)
        return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS);

    response.setContentType("application/json; charset=UTF-8");
    response.setHeader("Cache-Control", "no-cache, must-revalidate");
    response.getWriter().print("{\"authStatus\":\"required\"}");
    return AuthenticationResult.createFrom(AuthenticationStatus.REQUIRED);
}

```

The authenticator checks the credentials for basic validity, creates an `authenticationData` object, and returns `SUCCESS`. `SUCCESS` means only that the credentials were successfully collected; after that, the login module is called to validate the credentials.

Creating a custom Java authenticator (16 of 21)

- The `processRequest` method is called for each unauthenticated request to collect credentials.

```
@Override
public AuthenticationResult processRequest(HttpServletRequest request) {
    logger.info("MyCustomAuthenticator :: processRequest");
    if (request.getRequestURI().contains("my_custom_auth_")) {
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password && username.length() > 0 && password.length() > 0) {
            authenticationData = new HashMap<String, Object>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS);
        } else {
            response.setContentType("application/json; charset=UTF-8");
            response.setHeader("Cache-Control", "no-cache, must-revalidate");
            response.getWriter().print("{\"authStatus\":\"required\", \"errorMessage\":\"Please enter username and password\"}");
            return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);
        }
    }

    if (!isAccessToProtectedResource) {
        return AuthenticationResult.createFrom(AuthenticationStatus.REQUEST_NOT_RECOGNIZED);
    }

    response.setContentType("application/json; charset=UTF-8");
    response.setHeader("Cache-Control", "no-cache, must-revalidate");
    response.getWriter().print("{\"authStatus\":\"required\"}");
    return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);
}
```

If a problem occurs with the received credentials, the authenticator adds an error message to the response and returns `CLIENT_INTERACTION_REQUIRED`. The client must still supply authentication data.

Creating a custom Java authenticator (17 of 21)

- The `processRequest` method is called for each unauthenticated request to collect credentials.

```
@Override
public AuthenticationResult processRequest(HttpServletRequest request) {
    Logger.info("MyCustomAuthenticator :: processRequest");
    if (request.getRequestURI().contains("my_custom_auth_request")) {
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password && username.length() > 0) {
            authenticationData = new HashMap<String, Object>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(AuthenticationStatus.SUCCESS, authenticationData);
        } else {
            response.setContentType("application/json; charset=UTF-8");
            response.setHeader("Cache-Control", "no-cache, must-revalidate");
            response.getWriter().print("{\"authStatus\": \"required\"}");
            return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED, authenticationData);
        }
    }
}
```

The `isAccessToProtectedResource` argument specifies whether an access attempt was made to a protected resource. If not, the method returns `REQUEST_NOT_RECOGNIZED`, which means that the authenticator treatment is not required, and can proceed with the request as is.

```
if (!isAccessToProtectedResource)
    return AuthenticationResult.createFrom(AuthenticationStatus.REQUEST_NOT_RECOGNIZED);
```

```
response.setContentType("application/json; charset=UTF-8");
response.setHeader("Cache-Control", "no-cache, must-revalidate");
response.getWriter().print("{\"authStatus\": \"required\"}");
return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);
```

Creating a custom Java authenticator (18 of 21)

- The `processRequest()` method is called for each unauthenticated request to collect credentials.

```

@Override
public AuthenticationResult processRequest(HttpServletRequest request, HttpServletResponse response, boolean isAccessToProtectedResource) {
    Logger.info("MyCustomAuthenticator :: processRequest");
    if (request.getRequestURI().contains("my_custom_auth_request_url")){
        String username = request.getParameter("username");
        String password = request.getParameter("password");

        if (null != username && null != password && username.length() > 0 && password.length() > 0) {
            authenticationData = new HashMap<String, Object>();
            authenticationData.put("username", username);
            authenticationData.put("password", password);
            return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);
        } else {
            response.setContentType("application/json; charset=UTF-8");
            response.setHeader("Cache-Control", "no-cache, must-revalidate");
            response.getWriter().print("{\"authStatus\":\"required\"}");
            return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);
        }
    }

    if (!isAccessToProtectedResource)
        return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);

    response.setContentType("application/json; charset=UTF-8");
    response.setHeader("Cache-Control", "no-cache, must-revalidate");
    response.getWriter().print("{\"authStatus\":\"required\"}");
    return AuthenticationResult.createFrom(AuthenticationStatus.CLIENT_INTERACTION_REQUIRED);
}

```

If the request made to a protected resource does not contain authentication data, the authenticator adds an `authStatus:required` property to the response, and also returns a `CLIENT_INTERACTION_REQUIRED` status.

Creating a custom Java authenticator (19 of 21)

- The authenticator `getAuthenticationData` method is used by a login module to get collected credentials.

```
@Override
public Map<String, Object> getAuthenticationData() {
    logger.info("getAuthenticationData");
    return authenticationData;
}
```

- After the authenticated session is established, all requests are transported through the `changeResponseOnSuccess` and `processRequestAlreadyAuthenticated` methods.
- You can use these methods to retrieve data from requests and to update responses.

Creating a custom Java authenticator (20 of 21)

- The `changeResponseOnSuccess` method is called after credentials are successfully validated by the login module.
- You can use this method to modify the response before you return it to the client.
- This method must return `true` if the response was modified, `false` otherwise.
- Use it to notify a client application about the authentication success.

```
@Override
public boolean changeResponseOnSuccess(HttpServletRequest request, HttpServletResponse response) throws IOException {
    logger.info("MyCustomAuthenticator :: changeResponseOnSuccess");
    if (request.getRequestURI().contains("my_custom_auth_request_url")){
        response.setContentType("application/json; charset=UTF-8");
        response.setHeader("Cache-Control", "no-cache, must-revalidate");
        response.getWriter().print("{\"authStatus\":\"complete\"}");
        return true;
    }
    return false;
}
```

Creating a custom Java authenticator (21 of 21)

- The `processRequestAlreadyAuthenticated` method returns `AuthenticationResult` objects for authenticated requests.

```
@Override
public AuthenticationResult processRequestAlreadyAuthenticated(HttpServletRequest request,
    logger.info("processRequestAlreadyAuthenticated");
    return AuthenticationResult.REQUEST_NOT_RECOGNIZED;
}
```

- If the login module returns an authentication failure, the `processAuthenticationFailure` method is called. This method writes an error message to a response body, and returns the `CLIENT_INTERACTION_REQUIRED` status.

```
@Override
public AuthenticationResult processAuthenticationFailure(HttpServletRequest request, HttpServletResponse response,
    String errorMessage) throws IOException, ServletException {

    logger.info("processAuthenticationFailure");
    response.setContentType("application/json; charset=UTF-8");
    response.setHeader("Cache-Control", "no-cache, must-revalidate");
    response.getWriter().print("{\"authRequired\":true, \"errorMessage\":\"" + errorMessage + "\"}");
    return AuthenticationResult.CLIENT_INTERACTION_REQUIRED;
}
```

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- Examining the result

Creating a custom Java login module (1 of 20)

- The login module API includes the following methods:
 - `void init(Map<String, String> options)`
 - `boolean login(Map<String, Object> authenticationData)`
 - `UserIdentity createIdentity(String loginModule)`
 - `void logout()`
 - `void abort()`
 - `WorkLightAuthLoginModule`

The `init` method of the login module is called when the login module instance is created. This method receives the options that are specified in the login module definition of the `authenticationConfig.xml` file.

Creating a custom Java login module (2 of 20)

- The login module API is:
 - void **init**(Map<String, String> options)
 - boolean **login**(Map<String, Object> authenticationData)
 - UserIdentity **createIdentity**(String loginModule)
 - void **logout**()
 - void **abort**()
 - WorkLightAuthLoginModule

The `login` method of the login module is used to validate the credentials that are collected by the authenticator.

Creating a custom Java login module (3 of 20)

- The login module API is:
 - void **init**(Map<String, String> options)
 - boolean **login**(Map<String, Object> authenticationData)
 - **UserIdentity createIdentity**(String loginModule)
 - void **logout**()
 - void **abort**()
 - WorkLightAuthLoginModule

The `createIdentity` method of the login module is used to create a `userIdentity` object after validation of the credentials succeeds.

Creating a custom Java login module (4 of 20)

- The login module API is:
 - void **init**(Map<String, String> options)
 - boolean **login**(Map<String, Object> authenticationData)
 - UserIdentity **createIdentity**(String loginModule)
 - void **logout**()
 - void **abort**()
 - WorkLightAuthLoginModule

The `logout` and `abort` methods are used to clean up cached data after a logout or authentication aborts.

Creating a custom Java login module (5 of 20)

- The login module API is:

- void **init**(Map<String, String> configuration)
- boolean **login**(Map<String, String> authenticationData)
- UserIdentity **createIdentity**(Map<String, String> authenticationData)
- void **logout**()
- void **abort**()
- WorkLightLoginModule **clone**()

The `clone` method is used to create a deep copy of the class members.

Creating a custom Java login module (6 of 20)

- Create a **MyCustomLoginModule** class in the **server\java** folder.
- Make sure that this class implements the **WorkLightAuthLoginModule** interface.

```
public class MyCustomLoginModule implements WorkLightAuthLoginModule {
```

- Add two private class members, `USERNAME` and `PASSWORD`, to hold the user credentials

```
private String USERNAME;  
private String PASSWORD;
```

Creating a custom Java login module (7 of 20)

- The `init` method is called when the login module instance is created. As its parameter, it takes the map of options that are specified in a login module definition in the **authenticationConfig.xml** file.

```
@Override
public void init(Map<String, String> options) throws MissingConfigurationOptionException {
    logger.info("init");
}
```

- The `clone` method of the login module creates a deep copy of the object members.

```
@Override
public MyCustomLoginModule clone() throws CloneNotSupportedException {
    return (MyCustomLoginModule) super.clone();
}
```

Creating a custom Java login module (8 of 20)

- The `login` method is called after the authenticator returns the `SUCCESS` status.

```
@Override
public boolean login(Map<String, Object> authenticationData) {
    Logger.info("MyCustomLoginModule :: login");
    USERNAME = (String) authenticationData.get("username");
    PASSWORD = (String) authenticationData.get("password");

    if (USERNAME.equals("wuser") && PASSWORD.equals("12345"))
        return true;
    else
        throw new RuntimeException("Invalid credentials");
}
```

When called, the `login` method gets an `authenticationData` object from the authenticator.

Creating a custom Java login module (9 of 20)

- The `login` method is called after the authenticator returns the `SUCCESS` status.

```
@Override
public boolean login(Map<String, Object> authenticationData) {
    logger.info("MyCustomLoginModule :: login");
    USERNAME = (String) authenticationData.get("username");
    PASSWORD = (String) authenticationData.get("password");

    if (USERNAME.equals("wuser") && PASSWORD.equals("12345"))
        return true;
    else
        throw new RuntimeException("Invalid credentials");
}
```

The `login` method retrieves the user name and password that the authenticator previously stored.

Creating a custom Java login module (10 of 20)

- The `login` method is called after the authenticator returns the `SUCCESS` status.

```
@Override
public boolean login(Map<String, Object> authenticationData) {
    Logger.info("MyCustomLoginModule :: login");
    USERNAME = (String) authenticationData.get("username");
    PASSWORD = (String) authenticationData.get("password");

    if (USERNAME.equals("wluser") && PASSWORD.equals("12345"))
        return true;
    else
        throw new RuntimeException("Invalid credentials");
}
```

In this example, the login module validates the credentials against hardcoded values. You can implement your own validation rules. The `login` method returns `true` if the credentials are valid.

Creating a custom Java login module (11 of 20)

- The `login` method is called after the authenticator returns the `SUCCESS` status.

```
@Override
public boolean login(Map<String, Object> authenticationData) {
    logger.info("MyCustomLoginModule :: login");
    USERNAME = (String) authenticationData.get("username");
    PASSWORD = (String) authenticationData.get("password");

    if (USERNAME.equals("wuser") && PASSWORD.equals("12345"))
        return true;
    else
        throw new RuntimeException("Invalid credentials");
}
```

If the validation fails, the `login` method can either return `false` or throw a `RuntimeException`. The exception string is returned to the authenticator as an `errorMessage` parameter.

Creating a custom Java login module (12 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

After the `login` method returns `true`, the `createIdentity` method is called. It is used to create a `UserIdentity` object. You can store your own custom attributes in it to use later in Java or adapter code.

Creating a custom Java login module (13 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```

Creating a custom Java login module (14 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    Logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

Login module
name to set user
for

The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```

Creating a custom Java login module (15 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    Logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

A unique user identifier

The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```

Creating a custom Java login module (16 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

User display name



The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```


Creating a custom Java login module (17 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

User Java security roles

The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```

Creating a custom Java login module (18 of 20)

- The `createIdentity` method is called when the `login` method returns `true`. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

Custom user attributes

The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```

Creating a custom Java login module (19 of 20)

- The `createIdentity` method is called when the `login` method returned **true**. It is used to create an authenticated user identity object.

```
@Override
public UserIdentity createIdentity(String loginModule) {
    logger.info("MyCustomLoginModule :: createIdentity");

    HashMap<String, Object> customAttributes = new HashMap<String, Object>();
    customAttributes.put("AuthenticationDate", new Date());

    UserIdentity identity = new UserIdentity(loginModule, USERNAME, null, null, customAttributes, PASSWORD);
    return identity;
}
```

Sensitive user credentials that are not to be persisted.

The `UserIdentity` object contains user information. Its constructor is:

```
public UserIdentity(String loginModule,
                    String name,
                    String displayName,
                    Set<String> roles,
                    Map<String, Object> attributes,
                    Object credentials)
```

Creating a custom Java login module (20 of 20)

- The `logout` and `abort` methods are used to clean up class members after the user logs out or aborts the authentication flow.

```
@Override
public void logout() {
    logger.info("MyCustomLoginModule :: logout");
    USERNAME = null;
    PASSWORD = null;
}

@Override
public void abort() {
    logger.info("MyCustomLoginModule :: abort");
    USERNAME = null;
    PASSWORD = null;
}
```

Agenda

- Introduction to authentication
- Configuring the authenticationConfig.xml file
- Creating a custom Java authenticator
- Creating a custom Java login module
- **Creating client-side authentication components**
- Examining the result

Creating client-side authentication components (1 of 13)

- Create a Worklight application.
- The application consists of two main `<div>` elements:
 - The `<div id="AppBody">` element is used to display the application content.
 - The `<div id="AuthBody">` element is used for authentication forms.
- When authentication is required, the application hides `AppBody` and shows `AuthBody`. When authentication is complete, it does the opposite.

Creating client-side authentication components (2 of 13)

- Start by creating an `<AppBody>` element.
- It has a basic structure and functions.

```
<div id="AppBody">  
  <div class="wrapper">  
    <input type="button" class="appButton" value="Call protected adapter proc"  
      onclick="getSecretData()" />  
    <input type="button" class="appButton" value="Logout"  
      onclick="WL.Client.logout('CustomAuthenticatorRealm',{onSuccess: WL.Client.reloadApp})" />  
  </div>  
</div>
```

- Buttons are used to call the `getSecretData` procedure and to log out.

Creating client-side authentication components (3 of 13)

- AuthBody contains the following elements:

```
<div id="AuthBody" style="display: none">  
  <div id="LoginForm"><br />  
    <input type="text" id="usernameInputField" placeholder="Enter username" /><br />  
    <input type="password" id="passwordInputField" placeholder="Enter password"/><br />  
    <input type="button" id="LoginButton" class="formButton" value="Login" />  
    <input type="button" id="cancelButton" class="formButton" value="Cancel" />  
  </div>  
</div>
```

- Username and password input fields
- Login and Cancel buttons
- AuthBody is styled as `display:none` because it must not be displayed before the server requests the authentication.

Creating client-side authentication components (4 of 13)

- The following API describes how to create the challenge handler and implement its functionality:

```
var myChallengeHandler = WL.Client.createChallengeHandler("realm-name");  
  
myChallengeHandler.isCustomResponse = function (response){  
    return false;  
};  
  
myChallengeHandler.handleChallenge = function (response){  
};
```

Use

`WL.Client.createChallengeHandler` to create a challenge handler object. Supply a realm name as a parameter.

Create a challenge handler to define a customized authentication flow. In your challenge handler, do not add code that modifies the user interface when this modification is not related to the authentication flow.

Creating client-side authentication components (5 of 13)

- The following API describes how to create the challenge handler and implement its functionality:

```
var myChallengeHandler = WL.Client.createChallengeHandler("realm-name");  
  
myChallengeHandler.isCustomResponse = function (response){  
    return false;  
};  
  
myChallengeHandler.handleChallenge = function (response){  
};
```

The `isCustomResponse` function of the challenge handler is called each time a response is received from the server. It is used to detect whether the response contains data that is related to this challenge handler. It must return **true** or **false**.

Creating client-side authentication components (6 of 13)

- The following API describes how to create the challenge handler and implement its functionality.

```
var myChallengeHandler = WL.Client.createChallengeHandler("realm-name");  
  
myChallengeHandler.isCustomResponse = function (response){  
    return false;  
};  
  
myChallengeHandler.handleChallenge = function (response){  
};
```

If `isCustomResponse` returns **true**, the framework calls the `handleChallenge` function. This function is used to perform required actions, such as hide application screen and show login screen.

Creating client-side authentication components (7 of 13)

- In addition to the methods that the developer must implement, the challenge handler contains functionality that the developer might want to use:
 - Use `submitLoginForm` to send collected credentials to a specific URL. The developer can also specify request parameters, headers, and callback.
 - Use `submitSuccess` to notify the Worklight framework that the authentication finished successfully. The Worklight framework then automatically issues the original request that triggered the authentication.
 - Use `submitFailure` to notify the Worklight framework that the authentication completed with a failure. The Worklight framework then disposes of the original request that triggered the authentication
- * **Note: Attach each of these functions to its object. For example:**
`myChallengeHandler.submitSuccess()`
- You use these functions during the implementation of the challenge handler in the next slides.

Creating client-side authentication components (8 of 13)

- Create a challenge handler.

```
var customAuthenticatorRealmChallengeHandler = WL.Client.createChallengeHandler("CustomAuthenticatorRealm");

customAuthenticatorRealmChallengeHandler.isCustomResponse = function(response) {
    if (!response || !response.responseJSON) {
        return false;
    }

    if (response.responseJSON.authStatus)
        return true;
    else
        return false;
};

customAuthenticatorRealmChallengeHandler.handleChallenge = function(response) {
    var authStatus = response.responseJSON.authStatus;

    if (authStatus == "required"){
        $('#AppBody').hide();
        $('#AuthBody').show();
        $('#passwordInputField').val('');
        if (response.responseJSON.errorMessage){
            alert(response.responseJSON.errorMessage);
        }
    } else if (authStatus == "complete"){
        $('#AppBody').show();
        $('#AuthBody').hide();
        customAuthenticatorRealmChallengeHandler.submitSuccess();
    }
};
```

If the challenge JSON block contains the `authStatus` property, return **true**, otherwise return **false**.

Creating client-side authentication components (9 of 13)

- Create a challenge handler.

```
var customAuthenticatorRealmChallengeHandler =
customAuthenticatorRealmChallengeHandler.isCustomAuthenticatorRealmChallengeHandler
    if (!response || !response.responseJSON) {
        return false;
    }

    if (response.responseJSON.authStatus)
        return true;
    else
        return false;
};

customAuthenticatorRealmChallengeHandler.handleChallenge = function(response){
    var authStatus = response.responseJSON.authStatus;

    if (authStatus == "required"){
        $('#AppBody').hide();
        $('#AuthBody').show();
        $('#passwordInputField').val('');
        if (response.responseJSON.errorMessage){
            alert(response.responseJSON.errorMessage);
        }
    } else if (authStatus == "complete"){
        $('#AppBody').show();
        $('#AuthBody').hide();
        customAuthenticatorRealmChallengeHandler.submitSuccess();
    }
};
```

If the `authStatus` property equals "required", show the login form, clean up the password input field, and display the error message if applicable.

Creating client-side authentication components (10 of 13)

- Create a challenge handler.

```
var customAuthenticatorRealmChallengeHandler = WL.Client.createChallengeHandler("CustomAuthenticatorRealm");

customAuthenticatorRealmChallengeHandler.isCustomAuthenticatorRealmChallengeHandler = function(response) {
    if (!response || !response.responseJSON) {
        return false;
    }

    if (response.responseJSON.authStatus)
        return true;
    else
        return false;
};

customAuthenticatorRealmChallengeHandler.handleResponse = function(response) {
    var authStatus = response.responseJSON.authStatus;

    if (authStatus == "required"){
        $('#AppBody').hide();
        $('#AuthBody').show();
        $('#passwordInputField').val('');
        if (response.responseJSON.errorMessage){
            alert(response.responseJSON.errorMessage);
        }
    } else if (authStatus == "complete"){
        $('#AppBody').show();
        $('#AuthBody').hide();
        customAuthenticatorRealmChallengeHandler.submitSuccess();
    }
};
```

if authStatus equals “complete”, hide the login screen, return to the application, and notify the Worklight framework that authentication completed successfully.

Creating client-side authentication components (11 of 13)

- Create a challenge handler.

```
$('#loginButton').bind('click', function () {  
    var reqURL = '/my_custom_auth_request_url';  
    var options = {};  
    options.parameters = {  
        username : $('#usernameInputField').val(),  
        password : $('#passwordInputField').val()  
    };  
    options.headers = {};  
    customAuthenticatorRealmChallengeHandler.submitLoginForm(reqURL, options,  
        customAuthenticatorRealmChallengeHandler.submitLoginFormCallback);  
});
```

```
$('#cancelButton').bind('click', function () {  
    $('#AppBody').show();  
    $('#AuthBody').hide();  
    customAuthenticatorRealmChallengeHand  
});
```

Clicking a **login** button triggers the function that collects the user name and password from HTML input fields and submits them to server. You can set request headers here and specify callback functions.

Creating client-side authentication components (12 of 13)

- Create a challenge handler.

```
$('#loginButton').bind('click', function () {  
    var reqURL = '/my_custom_auth_request_url';  
    var options = {};  
    options.parameters = {  
        username : $('#usernameInputField').val(),  
        password : $('#passwordInputField').val()  
    };  
    options.headers = {};  
    customAuthenticatorRealmChallengeHandler.submitLoginForm(reqURL, options,  
        customAuthenticatorRealmChallengeHandler.submitLoginFormCallback);  
});  
  
$('#cancelButton').bind('click', function () {  
    $('#AppBody').show();  
    $('#AuthBody').hide();  
    customAuthenticatorRealmChallengeHandler.submitFailure();  
});
```

Clicking a **cancel** button hides authBody, shows appBody, and notifies the Worklight framework that authentication failed.

Creating client-side authentication components (13 of 13)

- Create a challenge handler.

```
customAuthenticatorRealmChallengeHandler.submitLoginFormCallback = function(response) {  
    var isLoginFormResponse = customAuthenticatorRealmChallengeHandler.isCustomResponse(response);  
    if (isLoginFormResponse){  
        customAuthenticatorRealmChallengeHandler.handleChallenge(response);  
    }  
};
```

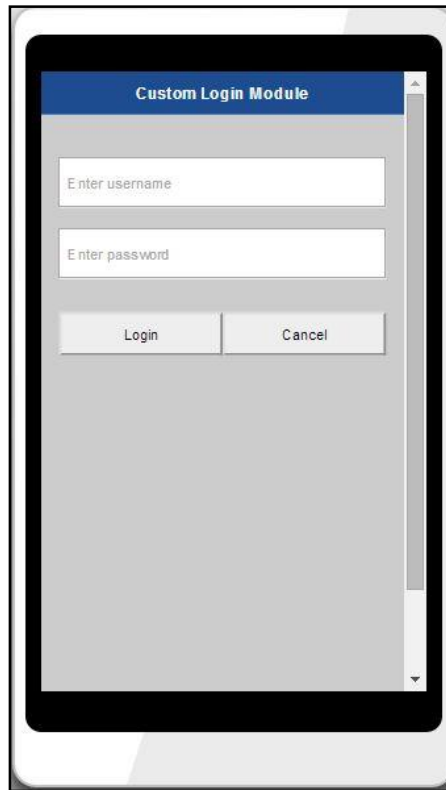
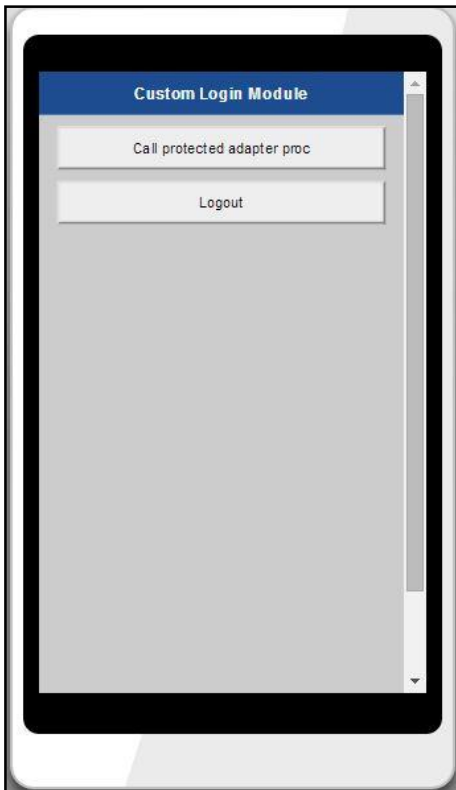
The callback function checks the response for the containing server challenge once again. If the challenge is found, the `handleChallenge` function is called again.

Agenda

- Introduction to authentication
- Configuring the authenticationConfig.xml file
- Creating a custom Java authenticator
- Creating a custom Java login module
- Creating client-side authentication components
- Examining the result

Examining the Result

- You can find the sample for this training module in the Getting Started page of the IBM Worklight Foundation documentation website at <http://www.ibm.com/mobile-docs>
- Enter *wluser* and *12345* as the user credentials



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