

# Two-Step adapter authentication

## Overview

This tutorial demonstrates how to implement "Two-Step" adapter-based authentication.

*Two-Step* means that after the initial authentication that uses, for example, a username and a password, an additional authentication step is required, such as a login pin, a secret word, or similar identification. In this example, a secret word is implemented for the second authentication step. The code snippets and sample application in this tutorial are based on the existing adapter-based authentication sample ([../authentication-security/adapter-based-authentication/](#)). The changes extend the application from *single-step* to *Two-Step*.

## Session-independent mode

By default, MobileFirst Platform Foundation 7.1 applications run in a session-independent mode, meaning that you can no longer use HTTP sessions or global variables to persist data across requests. Instead, MobileFirst apps must use a third-party database to store applicative states.

To learn more about the session-independent mode, see its topic in the user documentation.

To demonstrate how to store user data, the tutorial uses the `WL.Server.getClientId` API and a Cloudant database.

## Agenda

- Prerequisite - Creating an IBM Cloudant account
- Configuring the authenticationConfig.xml file
- Creating the server-side authentication components
- Creating the client-side authentication components
- Sample application

## Prerequisite - Creating an IBM Cloudant account

This sample uses IBM Cloudant Database to save user data. To run the sample and understand how to work with Cloudant, first sign up for a free account (<https://cloudant.com/sign-up/>) and create a database. Then proceed as follows:

- Change the database permissions - Follow the instructions in the Changing Database Permissions (<https://cloudant.com/changing-database-permissions-tutorial/>) tutorial.
- Basic authentication - The basic authentication value is passed as part of every request to the database. Instead of using your username and password to identify, use base-64 encoding to generate a string that is created by concatenating the API `key` and `password`, separated by a column character in the following manner: `key:password`. You use it later to send requests to the database.

For more information, read the Cloudant Basic Authentication (<https://docs.cloudant.com/authentication.html#basic-authentication>) documentation.

# Configuring the authenticationConfig.xml file

## Realms

Add a realm or replace the existing `AuthLoginModule` realm in the `realms` section of the `authenticationConfig.xml` file:

```
<realm loginModule="AuthLoginModule" name="TwoStepAuthRealm">
  <className>com.worklight.integration.auth.AdapterAuthenticator</className>
>
  <parameter name="login-function" value="AuthAdapter.onAuthRequired"/>
  <parameter name="logout-function" value="AuthAdapter.onLogout"/>
</realm>
```

## Security tests

Add a security test or replace the existing `AuthSecurityTest` in the `securityTests` section of the `authenticationConfig.xml` file:

```
<customSecurityTest name="TwoStepAuthAdapter-securityTest">
  <test isInternalUserID="true" realm="TwoStepAuthRealm"/><
</customSecurityTest><br />
```

To review the remaining/existing sample components, see the Adapter-based authentication ([../authentication-security/adapter-based-authentication/](#)) tutorial.

## Creating the server-side authentication components

To put in place the Two-Step authentication process, several changes are necessary to the adapter file (whether XML or JavaScript) and to the database.

### Adapter XML file

Edit the `AuthAdapter.xml` file:

1. Change the domain name to your Cloudant domain:

```
<domain>$USERNAME.cloudant.com</domain>
```

2. Add the following procedure:

```
<procedure name="submitAuthenticationStep2" securityTest="wl_unprotected"/>
```

3. Protect the `getSecretData` method with the new `TwoStepAuthAdapter-securityTest`

### Adapter JavaScript file

Edit the `AuthAdapter-impl.js` file:

1. Create a variable to save the basic authentication encoded string you have generated before:

```
var auth = "Basic REPLACE_ME_WITH_THE_BASE-64_ENCODED_STRING";
```

2. Create a variable to save your database name:

```
var dbName = "REPLACE_ME_WITH_THE_DATABASE_NAME";
```

3. Update the `onAuthRequired` function to return that authentication step 1 is required:

```
function onAuthRequired(headers, errorMessage){  
  errorMessage = errorMessage ? errorMessage : null;  
  return {  
    authRequired: true,  
    authStep: 1,  
    errorMessage: errorMessage  
  };  
}
```

4. Update the `submitAuthenticationStep1` function:

- Add the following line to get the client ID:

```
function submitAuthenticationStep1(username, password){  
  if (username === "user" && password === "password"){  
    WL.Logger.debug("Step 1 :: SUCCESS");  
    var clientId = WL.Server.getClientId();  
    var userIdentity = {  
      userId: username,  
      displayName: username,  
      attributes: {}  
    };  
  };
```

- To save the `userIdentity` for the next authentication step, write it to the database. Use the `clientId` variable as the document `_id` key:

```
//Validate that the DB doesn't already contains the ClientId  
var response = deleteUserIdentityFromDB(dbName, null);  
//Write ClientId to DB  
var response = writeUserIdentityToDB(dbName, {_id:clientId, "userIdentity":userIdentity}  
);
```

- If step 1 authentication was successful, return that step 2 is required:

```

if (response){
  return {
    authRequired: true,
    authStep: 2,
    question: "What is your pet's name?",
    errorMessage : ""
  };
} else {
  return onAuthRequired(null, "Database ERROR");
}
} else{
  WL.Logger.debug("Step 1 :: FAILURE");
  return onAuthRequired(null, "Invalid login credentials")
;
}
}

```

5. Add `submitAuthenticationStep2` function to handle the second authentication step:

- Get the client ID and read it from the database:

```

function submitAuthenticationStep2(answer){
  var clientId = WL.Server.getClientId();
  var response = readUserIdentityFromDB(dbName, clientId);

```

- If step 2 authentication was successful, delete the client document from database:

```

if (response){
  if (answer === "Lassie"){
    var doc = JSON.parse(response.text);
    var userIdentity = doc.userIdentity;
    WL.Logger.debug("Step 2 :: SUCCESS");
    WL.Server.setActiveUser("TwoStepAuthRealm", userIdentity);
    WL.Logger.debug("Authorized access granted");
    var response = deleteUserIdentityFromDB(dbName, doc);
    return {
      authRequired: false
    };
  } else{
    WL.Logger.debug("Step 2 :: FAILURE");
    return onAuthRequired(null, "Wrong security question answer");
  }
} else {
  WL.Logger.debug("Step 1 :: FAILURE");
  return onAuthRequired(null, "Database ERROR");
}
}

```

## Database actions

To handle the database actions, use the `WL.Server.invokeHttp` method and Cloudant REST API.

- Write to the database:

```
function writeUserIdentityToDB(db, document){  
  var input = {  
    method : 'post',  
    returnedContentType : 'plain',  
    path : db,  
    headers: {  
      "Authorization":auth  
    },  
    body:{  
      contentType:'application/json; charset=UTF-8',  
      content:JSON.stringify(document)  
    }  
  };  
  
  var response = WL.Server.invokeHttp(input);  
  var responseString = "" + response.statusCode;  
  
  //Checking if the invocation was successful - status code = 2xx  
  if (responseString.indexOf("2") === 0){  
    return response;  
  }  
  return null;  
}
```

- Read from database:

```
function readUserIdentityFromDB(db, key){  
  var input = {  
    method : 'get',  
    returnedContentType : 'plain',  
    path : db + "/" + key,  
    headers: {  
      "Authorization":auth  
    }  
  };  
  
  var response = WL.Server.invokeHttp(input);  
  var responseString = "" + response.statusCode;</p>  
  
  //Checking if the invocation was successful - status code = 2xx  
  if (responseString.indexOf("2") === 0){  
    return response;  
  }  
  return null;  
}
```

- Delete from the database:

```

function deleteUserIdentityFromDB(db, document){
    var doc = document;

    if (!doc){
        var clientId = WL.Server.getClientId();
        var response = readUserIdentityFromDB(dbName, clientId)
    ;

        if(!response){
            return;
        } else {
            doc = JSON.parse(response.text);
        }
    }

    var id = doc._id; // The id of the doc to remove
    var rev = doc._rev; // The rev of the doc to remove
    var input = {
        method : 'delete',
        returnedContentType : 'plain',
        path : db + "/" + id + "?rev=" + rev,
        headers: {
            "Authorization":auth
        }
    };
    return WL.Server.invokeHttp(input);
}

```

To learn more about IBM Cloudant REST API, see the [Cloudant documentation](#).

## Creating the client-side authentication components

1. In `index.html`, use the `TwoStepAuthRealm` instead of the existing realm:

```

<div id="AppDiv">
    ...
    <input type="button" class="appButton" value="Logout"
onclick="WL.Client.logout('TwoStepAuthRealm', {onSuccess:WL.Client.reloadApp})" />
    <div id="ResponseDiv"></div>
</div>

```

2. Add a second authentication screen:

```

<div id="AuthStep2Div">
  <h3>Authentication Step 2</h3>
  <p id="AuthQuestion"></p>
  <input type="text" placeholder="Enter answer" id="AuthAnswer"/><br />
  <input type="button" class="formButton" value="Submit" id="AuthStep2Submit" /><input type="button" class="AuthCancelButton" value="Cancel" />
</div>

```

3. Finally, update the challenge handler accordingly.

In this example, a new challenge handler (a new `.js` file), called `TwoStepAuthRealmChallengeProcessor.js`, is created for this purpose.

- The response is checked as in the original sample application:

```

var TwoStepAuthRealmChallengeHandler = WL.Client.createChallengeHandler("TwoStepAuthRealm");

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

  if (typeof(response.responseJSON.authRequired) !== 'undefined'){
    return true;
  } else {
    return false;
  }
};

```

- Add another case for the second authentication step:

```

TwoStepAuthRealmChallengeHandler.handleChallenge = function(response){
var authRequired = response.responseJSON.authRequired;</p>

if (authRequired == true){
    $("#AppDiv").hide();
    $("#AuthDiv").show();
    $("#AuthInfo").empty();
    $("#AuthStep1Div").hide();
    $("#AuthStep2Div").hide();

    switch (response.responseJSON.authStep) {
        case 1:
            $("#AuthStep1Div").show();
            $("#AuthPassword").val("");
            break;
        case 2:
            $("#AuthStep2Div").show();
            $("#AuthAnswer").val("");
            $("#AuthQuestion").html(response.responseJSON.question);
            break;
    }

    if (response.responseJSON.errorMessage)
        $("#AuthInfo").html(response.responseJSON.errorMessage);
    } else if (authRequired == false){
        $("#AppDiv").show();
        $("#AuthDiv").hide();

        TwoStepAuthRealmChallengeHandler.submitSuccess();
    }
};

```



- Perform the second authentication step:



```

$("#AuthStep1Submit").bind('click', function () {
    var username = $("#AuthUsername").val();
    var password = $("#AuthPassword").val();
    var invocationData = {
        adapter : "AuthAdapter",
        procedure : "submitAuthenticationStep1",
        parameters : [ username, password ]
    };

    TwoStepAuthRealmChallengeHandler.submitAdapterAuthentication(invocationData, {})
;
});

$("#AuthStep2Submit").bind('click', function () {
    var answer = $("#AuthAnswer").val();
    var invocationData = {
        adapter : "AuthAdapter",
        procedure : "submitAuthenticationStep2",
        parameters : [ answer ]
    };

    TwoStepAuthRealmChallengeHandler.submitAdapterAuthentication(invocationData, {})
;
});

$(".AuthCancelButton").bind('click', function () {
    $("#AppDiv").show();
    $("#AuthDiv").hide();

    TwoStepAuthRealmChallengeHandler.submitFailure();
});

```

To review the remaining/existing sample client-side implementation, see the Adapter-based authentication in hybrid applications ([../../authentication-security/adapter-based-authentication/adapter-based-authentication-hybrid-applications/](#)) tutorial.

## Sample application

Click to download (<https://github.com/MobileFirst-Platform-Developer-Center/TwoStepAuth/tree/release71>) the sample application.