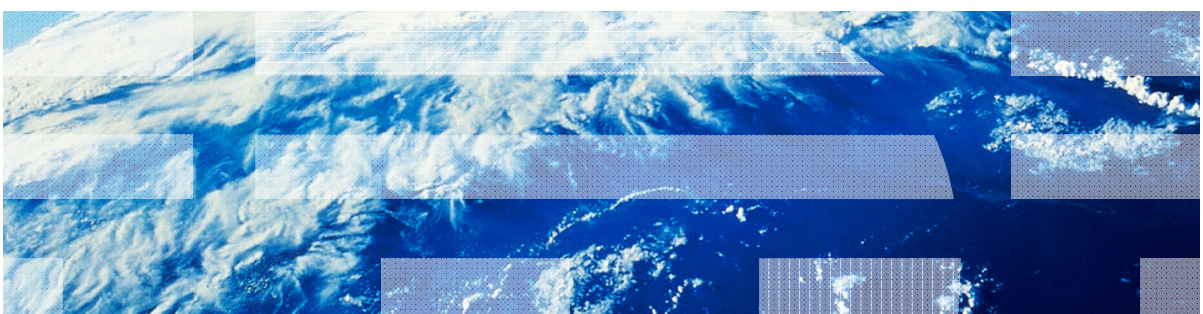
IBM Worklight V5.0.5
Getting Started

Module 25 – Custom Device Provisioning



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Agenda

- About
- Provisioning introduction
- Custom Provisioning introduction
- Creating a Custom Provisioning
- Examining the result

About

- This module explains how to create custom provisioning:
  - You learn how to implement a custom provisioning that uses a certificate from an external service to authenticate a device
  - You learn how to implement a custom authenticator that connects to that service
- Before you follow this module, make sure that you well understand the IBM Worklight® authentication concepts
  - Make sure that you have a solid understanding of the authentication modules 20 and 23
  - For more information about Worklight authentication concepts, see the IBM Worklight Information Center

Agenda

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Provisioning introduction

- Provisioning: A mechanism where a digital signature is created to protect the integrity and authenticity of a device or of an application

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Custom Provisioning introduction

- There are three types of provisioning processes in IBM Worklight:
  - No provisioning: the client application does not trigger the provisioning process, and the server does not verify the client certificate
  - Auto-provisioning: the Worklight Server automatically issues a certificate for the device and application data, provided by the client application
  - Custom provisioning: the Worklight Server is augmented with custom logic that controls the device and the application provisioning process.
    - This logic can involve integration with an external system that can issue the client certificate, based on data that is obtained from the app, or can instruct the Worklight Server to do so

Custom Provisioning introduction

- Whether obtained by auto-provisioning or custom provisioning process, the client app stores the certificate on the device
- The certificate is then used for signing the payload that is sent to the Worklight Server
- The Worklight server validates the client certificate, regardless of how it was obtained

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Creating a Custom Provisioning

- authenticationConfig.xml

```
<securityTests>
    <customSecurityTest name="customTests">
        <test realm="wl_authenticityRealm"/>
        <test realm="wl_remoteDisableRealm"/>
        <test isInternalUserID="true" realm="wl_anonymousUserRealm"/>
        <test isInternalDeviceID="true" realm="MyCustomProvisioning"/>
    </customSecurityTest>
</securityTests>
<realms>
    <realm loginModule="MyCustomProvisioningLoginModule" name="MyCustomR
        <className>com.prov.MyProvisioningAuthenticator</className>
        <parameter name="provisioned-entity" value="group:myapps"/>
        <parameter name="pre-required-realms" value="wl_authenticityReal
    </realm>

    <realm loginModule="StrongDummy" name="SampleAppRealm">
        <className>com.worklight.core.auth.ext.FormBasedAuthenticator</c
    </realm>

    <realm loginModule="requireLogin" name="WorklightConsole">
        <className>com.worklight.core.auth.ext.FormBasedAuthenticator</className>
        <onLoginUrl>/console</onLoginUrl>
    </realm>
</realms>
<loginModules>
    <loginModule name="MyCustomProvisioningLoginModule">
        <className>com.prov.MyProvisioningLoginModule</className>
    </loginModule>
    <loginModule name="StrongDummy">
        <className>com.worklight.core.auth.ext.NonValidatingLoginModule</className>
    </loginModule>
    <loginModule name="requireLogin">
        <className>com.worklight.core.auth.ext.SingleIdentityLoginModule</className>
    </loginModule>
</loginModules>
```

A test with isInternalDeviceID="true" must exist for the realm that you are going to use for custom provisioning (MyCustomProvisioning)

Creating a Custom Provisioning

- authenticationConfig.xml

```
<securityTests>
    <customSecurityTest name="customTests">
        <test realm="wl_authenticityRealm"/>
        <test realm="wl_remoteDisableRealm"/>
        <test isInternalUserID="true" realm="wl_anonymousUserRealm"/>
        <test isInternalDeviceID="true" realm="MyCustomProvisioning"/>
    </customSecurityTest>
</securityTests>
<realms>
    <realm loginModule="MyCustomProvisioningLoginModule" name="MyCustomP
        <className>com.prov.MyProvisioningAuthenticator</className>
        <parameter name="provisioned-entity" value="group:myapps"/>
        <parameter name="pre-required-realms" value="wl_authenticityRealm,W
    </realm>

    <realm loginModule="StrongDummy" name="SampleAppRealm">
        <className>com.worklight.core.auth.ext.FormBasedAuthenticator</className>
    </realm>

    <realm loginModule="requireLogin" name="WorklightConsole">
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<loginModules>
    <loginModule name="MyCustomProvisioningLoginModule">
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    </loginModule>
    <loginModule name="StrongDummy">
        <className>com.worklight.core.auth.ext.NonValidatingLoginModule</className>
    </loginModule>
    <loginModule name="requireLogin">
        <className>com.worklight.core.auth.ext.SingleIdentityLoginModule</className>
    </loginModule>
</loginModules>
```

The parameter provisioned-entity group:myapps states that all apps share same provision.
For Android, you need to have a shared user ID in the application-descriptor.xml file.

Creating a Custom Provisioning

- authenticationConfig.xml

```
<securityTests>
    <customSecurityTest name="customTests">
        <test realm="wl_authenticityRealm"/>
        <test realm="wl_remoteDisableRealm"/>
        <test isInternalUserID="true" realm="wl_anonymousUserRealm"/>
        <test isInternalDeviceID="true" realm="MyCustomProvisioning"/>
    </customSecurityTest>
</securityTests>
<realms>
    <realm loginModule="MyCustomProvisioningLoginModule" name="MyCustomPr
        <className>com.prov.MyProvisioningAuthenticator</className>
        <parameter name="provisioned-entity" value="group:myapps"/>
        <parameter name="pre-required-realms" value="wl_authenticityRealm,wl_remoteDisableRealm"/>
    </realm>

    <realm loginModule="StrongDummy" name="SampleAppRealm">
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    </loginModule>
    <loginModule name="StrongDummy">
        <className>com.worklight.core.auth.ext.NonValidatingLoginModule</className>
    </loginModule>
    <loginModule name="requireLogin">
        <className>com.worklight.core.auth.ext.SingleIdentityLoginModule</className>
    </loginModule>
</loginModules>
```

The parameter pre-required-realms has a list of comma delimited realms that are pre-existing in the authenticationConfig.xml file.

Creating a Custom Provisioning

- MyProvisioningLoginModule.java

```
package com.prov;

import com.worklight.core.auth.ext.DeviceAutoProvisioningLoginModule;

public class MyProvisioningLoginModule extends DeviceAutoProvisioningLoginModule {

}
```

Extending the DeviceAutoProvisioningLoginModule class with MyProvisioningLoginModule

Creating a Custom Provisioning

- MyProvisioningAuthenticator.java

Get the options that are declared in the authenticationConfig.xml file

```
package com.prov;

import java.io.BufferedReader;

public class MyProvisioningAuthenticator extends DeviceAutoProvisioningAuthenticator {

    private static URL MY_URL;

    @Override
    public void init(Map<String, String> option) throws MissingConfigurationOptionException {
        entityString = option.remove(PROVISIONED_ENTITY_PARAM_NAME);
        preRequiredRealms = option.remove(PRE_REQUIRED_REALMS_PARAM_NAME);
        super.init(option);

        try {
            MY_URL = new URL("http://localhost:8089/");
        } catch (MalformedURLException e) {
            throw new RuntimeException(e);
        }
    }

    @Override
    protected AuthenticationResult checkChallangeResponse(Object challengeResponse, HttpServletResponse response) throws IOException {
        if(challengeResponse instanceof JSONObject) {
            JSONObject challengeJSON = (JSONObject) challengeResponse;

            if (challengeJSON.containsKey(CSR_PARAM_NAME)) {
                if (isProvisioningAllowed()) {
                    return handleCSR((String) challengeJSON.get(CSR_PARAM_NAME), response);
                } else {
                    return AuthenticationResult.createFailureResult(new JSONObject(), "Provisioning is not allowed at this time");
                }

            }
        }
        return super.checkChallangeResponse(challengeResponse, response);
    }

    private AuthenticationResult handleCSR(String csr, HttpServletResponse response) {
        AuthenticationResult result;
        try {
            URLConnection connection = MY_URL.openConnection();
            connection.setDoOutput(true);
            connection.setDoInput(true);
```

Creating a Custom Provisioning

- MyProvisioningAuthenticator.java

```
package com.prov;

import java.io.BufferedReader;

public class MyProvisioningAuthenticator extends DeviceAutoProvisioningAuthenticator {

    private static URL MY_URL;

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        entityString = option.remove(PROVISIONED_ENTITY_PARAM_NAME);
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        super.init(option);

        try {
            MY_URL = new URL("http://localhost:8089/");
        } catch (MalformedURLException e) {
            throw new RuntimeException(e);
        }
    }

    @Override
    protected AuthenticationResult checkChallangeResponse(Object challengeResponse, HttpServletResponse response) throws IOException {
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            JSONObject challengeJSON = (JSONObject) challengeResponse;

            if (challengeJSON.containsKey(CSR_PARAM_NAME)) {
                if (isProvisioningAllowed()) {
                    return handleCSR((String) challengeJSON.get(CSR_PARAM_NAME), response);
                } else {
                    return AuthenticationResult.createFailureResult(new JSONObject(), "Provisioning is not allowed at this time");
                }

            }
        }
        return super.checkChallangeResponse(challengeResponse, response);
    }

    private AuthenticationResult handleCSR(String csr, HttpServletResponse response) {
        AuthenticationResult result;
        try {
            URLConnection connection = MY_URL.openConnection();
            connection.setDoOutput(true);
            connection.setDoInput(true);
```

This URL is the provisioning service URL.
In this case, the provisioning service is running on the localhost on port 8089.

Creating a Custom Provisioning

- MyProvisioningAuthenticator.java

```
package com.prov;

import java.io.BufferedReader;

public class MyProvisioningAuthenticator extends DeviceAutoProvisioningAuthenticator {

    private static URL MY_URL;

    @Override
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        entityString = option.remove(PROVISIONED_ENTITY_PARAM_NAME);
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        super.init(option);

        try {
            MY_URL = new URL("http://localhost:8089/");
        } catch (MalformedURLException e) {
            throw new RuntimeException(e);
        }
    }

    @Override
    protected AuthenticationResult checkChallangeResponse(Object challengeResponse, HttpServletResponse response) throws IOException {
        if(challengeResponse instanceof JSONObject) {
            JSONObject challengeJSON = (JSONObject) challengeResponse;

            if (challengeJSON.containsKey(CSR_PARAM_NAME)) {
                if (isProvisioningAllowed()) {
                    return handleCSR((String) challengeJSON.get(CSR_PARAM_NAME), response);
                } else {
                    return AuthenticationResult.createFailureResult(new JSONObject(), "Provisioning is not allowed at this time");
                }

            }
        }
        return super.checkChallangeResponse(challengeResponse, response);
    }

    private AuthenticationResult handleCSR(String csr, HttpServletResponse response) {
        AuthenticationResult result;
        try {
            URLConnection connection = MY_URL.openConnection();
            connection.setDoOutput(true);
            connection.setDoInput(true);
```

Overriding the AuthenticationResult checkChallengeResponse

Creating a Custom Provisioning

- MyProvisioningAuthenticator.java

```
package com.prov;

import java.io.BufferedReader;

public class MyProvisioningAuthenticator extends DeviceAutoProvisioningAuthenticator {

    private static URL MY_URL;

    @Override
    public void init(Map<String, String> option) throws MissingConfigurationOptionExcep
        entityString = option.remove(PROVISIONED_ENTITY_PARAM_NAME);
        preRequiredRealms = option.remove(PRE_REQUIRED_REALMS_PARAM_NAME);
        super.init(option);

        try {
            MY_URL = new URL("http://localhost:8089/");
        } catch (MalformedURLException e) {
            throw new RuntimeException(e);
        }
    }

    @Override
    protected AuthenticationResult checkChallangeResponse(Object challengeResponse, HttpServletResponse response) throws IOException {
        if(challengeResponse instanceof JSONObject) {
            JSONObject challengeJSON = (JSONObject) challengeResponse;

            if (challengeJSON.containsKey(CSR_PARAM_NAME)) {
                if (isProvisioningAllowed()) {
                    return handleCSR((String) challengeJSON.get(CSR_PARAM_NAME), response);
                } else {
                    return AuthenticationResult.createFailureResult(new JSONObject(), "Provisioning is not allowed at this time");
                }

            }
        }
        return super.checkChallangeResponse(challengeResponse, response);
    }

    private AuthenticationResult handleCSR(String csr, HttpServletResponse response) {
        AuthenticationResult result;
        try {
            URLConnection connection = MY_URL.openConnection();
            connection.setDoOutput(true);
            connection.setDoInput(true);
```

Checking whether there is a response for custom provisioning. If so, and if provisioning is allowed then call “handleCSR”.

Creating a Custom Provisioning

- MyProvisioningAuthenticator.java

```
            if (challengeJSON.containsKey(CSR_PARAM_NAME)) {
                if (isProvisioningAllowed()) {
                    return handleCSR((String) challengeJSON.get(CSR_PARAM_NAME), response);
                } else {
                    return AuthenticationResult.createFailureResult(new JSONObject(), "Provisioning is not allowed at this time");
                }

            }
        }
        return super.checkChallangeResponse(challengeResponse, response);
    }

    private AuthenticationResult handleCSR(String csr, HttpServletResponse response) {
        AuthenticationResult result;
        try {
            URLConnection connection = MY_URL.openConnection();
            connection.setDoOutput(true);
            connection.setDoInput(true);
            connection.connect();

            OutputStreamWriter osw = new OutputStreamWriter(connection.getOutputStream());

            osw.write(csr);
            osw.close();

            BufferedReader br = new BufferedReader(new InputStreamReader(connection.getInputStream()));

            StringBuffer sb = new StringBuffer();
            String s;
            while((s = br.readLine()) != null) {
                sb.append(s);
            }

            br.close();
            result = createNewChallenge();
            result.getJson().put(CERTIFICATE, sb.toString());
        }
        catch (IOException e) {
            result = AuthenticationResult.createFailureResult(new JSONObject(), e.getMessage());
        }
        return result;
    }
}
```

The “handleCSR” method connects to the provisioning service, and pushes the CSR.

Creating a Custom Provisioning

- myProvisioningChallengeHandler.js

```
var myCustomDeviceProvisioningChallengeHandler = WL.Client
      .createProvisioningChallengeHandler("MyCustomProvisioning");

myCustomDeviceProvisioningChallengeHandler.createJsonCsr = function(provisionEntity, realm, customPayload){
    var csrPayload = {};
    if (!WLJSX.Object.isUndefined(customPayload)){
        csrPayload = customPayload;
    }

    csrPayload.deviceId = device.uuid;

    if(provisionEntity == 'application') {
        csrPayload.applicationId = WL.StaticAppProps.APP_DISPLAY_NAME;
    } else if (provisionEntity.indexOf("group:") == 0){
        csrPayload.groupId = provisionEntity.substr(6);
    }

    myCustomDeviceProvisioningChallengeHandler.onCsrDataReady(csrPayload, provisionEntity);
};
```

Creating a provisioning challenge handler.
Creating a CSR payload with the device UUID.

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Examining the result

- The sample for this training module can be found in the Getting Started page of the IBM Worklight documentation website at http://www.ibm.com/mobile-docs.
- In the training module, the custom-prov.jar file exists in the provisioningService folder.
- Go into that folder, and use Java™ to run the custom-prov.jar through a command line, as follows:
  `java –jar custom-prov.jar`
  - The provisioning service will run on your localhost on port 8089.
- Build the customProvApp application a deploy it on an Android device.

Examining the result

- On the provisioning service console, you can see:

```
C:\Users\ravidor\Desktop>java -jar cutom-prov.jar
2012-12-02 14:54:47.660:INFO::Logging to StdErrLog::DEBUG=false via org.eclipse.
jetty.util.log.StdErrLog
2012-12-02 14:54:47.671:INFO::jetty-7.0.2-SNAPSHOT
2012-12-02 14:54:47.707:INFO::Started SelectChannelConnector@0.0.0.0:8089
csr: eyJqcGsiOnsiYWxnIjoiUlNBIiwiZXhwIjoiQVFBQiIsIm1vZCI6IkFQSOQ1Rmt1TjBkWGFQTm
zTUdKOVlVTHlPSmVmVlNNQl9OaHFFa25hYVE3R3U2bO85OVNMekIxajd5VFhtUm94TDFwcnRibjI2MW
yTW85ZlJncGZmazOifSwiYWxnIjoiUlMyNTYifQ==.eyJncm91cElkIjoibXlhcHBzIiwidG9rZW4iO
I2MmdqbHZzMG9pODJrazA5c2htYzdpdTMiLCJkZXZpY2VJZCI6Ijk3NzRkNTZkNjgyZTU0OWMifQ==.
5kqhBQ1K3oEPVkQIqEPT7KRWFyMuxBsdS8Vi3okcFvVAKZyHP6yqpOSKYQxc761KHiXoVo4JrRohXXK
eeuig==
Certificate sent:   [0]         Version: 3
         SerialNumber: 17512043915600993099
             IssuerDN: C=IL,ST=IL,L=Shefayim,O=IBM,OU=Worklight,CN=WL Dev
           Start Date: Sun Dec 02 14:57:33 IST 2012
           Final Date: Sat Dec 02 14:57:33 IST 2062
            SubjectDN: DC=myapps,UID=9774d56d682e549c
           Public Key: RSA Public Key
            modulus: f283e4592e37475768f365dcc189f5850bc8e25e7d548c07f361a84927
9a43b1aeea83bdf522f30758fbc935e6468c4bd69aed6e7dbad60d8ca3d7d18297df9
    public exponent: 10001

  Signature Algorithm: SHA256WithRSAEncryption
            Signature: 34597cef584dcbc42bd54d0b4b8fed6b5929004a
                       36f62e65ccc39f6b009cc4f94409d9201bf304aa
                       8d30149f155a824b6a157e084d903f5d1ad34f96
                       322e825042cee8362f63724a68d7483a962d3bc5
                       8fe29ea54ff66c5962524787787b130e8dc68326
                       747336cff511b99055e85a277fbc8625fe4239cf
                       20b7567175f1b7d3199e0c99802a9105db92a937
                       93646a641bf6eaa22a4aa4a721f68ecf82b001a0
                       ff2070dea372810cc550b1557fe921e8422ee240
                       8cee0029a519bb88811f85d93f7592b1662fc4c6
                       287a9fd573053d32a04a6f45751bd00ebe83c7dc
                       3a13ae04aa5ece21de1fde1f98686256e52f2354
                       ab25ab3cee1d265650c761e4ddb9470b
```

CSR that is received from the device

The certificate that is sent back

Examining the result

- On the LogCat you can see:

Text

```
/android/init] success: /*-secure-
{"userPrefs":{},"gadgetProps":{"directUpdate":{"availableSkins":["d
efault"],"checksum":664823034,"updateSize":279769},"ENVIRONMENT":"a
ndroid"},"userInfo":{"wl_authenticityRealm":{"userId":"wl_authentic
ityLoginModule","attributes":{},"isUserAuthenticated":1,"displayNam
e":"wl_authenticityLoginModule"},"MyCustomProvisioning":{"userId":"
device","attributes":{"mobileClientData":"com.worklight.core.auth.i
mpl.MobileClientData@2ffc32e3"},"isUserAuthenticated":1,"displayNam
e":"device"},"SampleAppRealm":{"userId":null,"attributes":{},"isUse
rAuthenticated":0,"displayName":null},"wl_remoteDisableRealm":{"use
rId":"NullLoginModule","attributes":{},"isUserAuthenticated":1,"dis
playName":"NullLoginModule"},"wl_antiXSRFRealm":{"userId":null,"att
ributes":{},"isUserAuthenticated":0,"displayName":null},"WorklightC
onsole":{"userId":null,"attributes":{},"isUserAuthenticated":0,"dis
playName":null},"wl_deviceAutoProvisioningRealm":{"userId":null,"at
tributes":{},"isUserAuthenticated":0,"displayName":null},"wl_device
NoProvisioningRealm":{"userId":null,"attributes":{},"isUserAuthenti
cated":0,"displayName":null},"myserver":{"userId":"3bd3095d-ae36-4e
8e-9053-281ec320455b","attributes":{},"isUserAuthenticated":1,"disp
layName":"3bd3095d-ae36-4e8e-9053-281ec320455b"},"wl_anonymousUserR
ealm":{"userId":"3bd3095d-ae36-4e8e-9053-281ec320455b","attributes"
:{},"isUserAuthenticated":1,"displayName":"3bd3095d-ae36-4e8e-9053-
281ec320455b"}}}*/
```

myCustomProvisioning is unauthenticated.

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