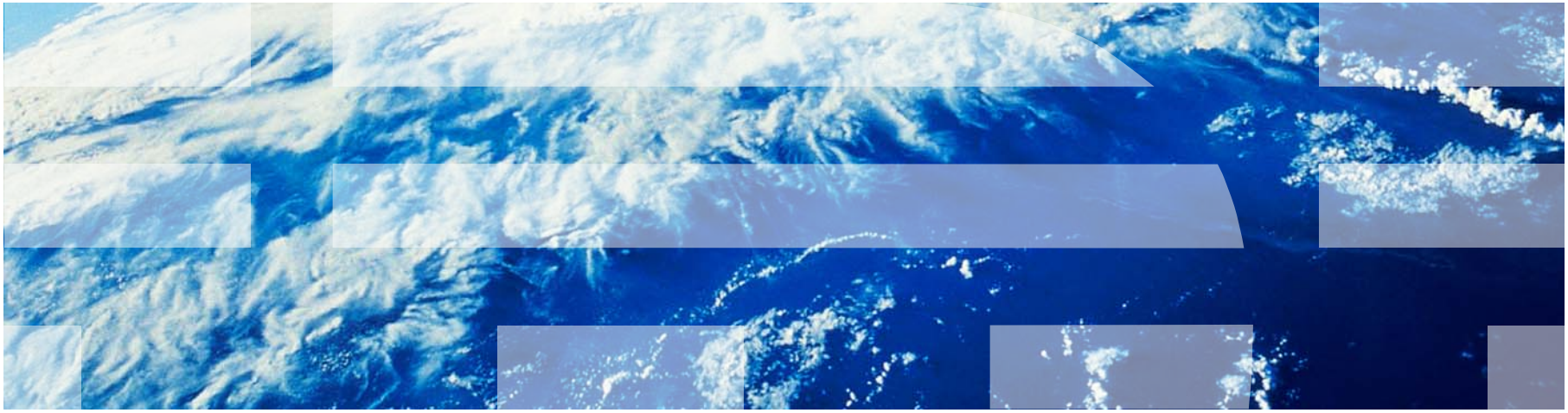
IBM Worklight V6.1.0
Getting Started

Custom device provisioning



6 December 2013

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Agenda

- Overview
- Understanding custom device provisioning
- Configuring authenticationConfig.xml
- Implementing server-side components
- Implementing client-side components
- Examining the result

Overview

- In this training module you will learn how to enable and configure custom device provisioning
- Custom device provisioning is an extension of auto device provisioning, which allows you to implement custom validations of:
  - Certificate Signing Request during initial provisioning flow
  - Certificate during every application start up
- It is vital to gain a solid understanding of the topics discussed in the *Device Provisioning Concepts* training module, because this training module is fully based on them

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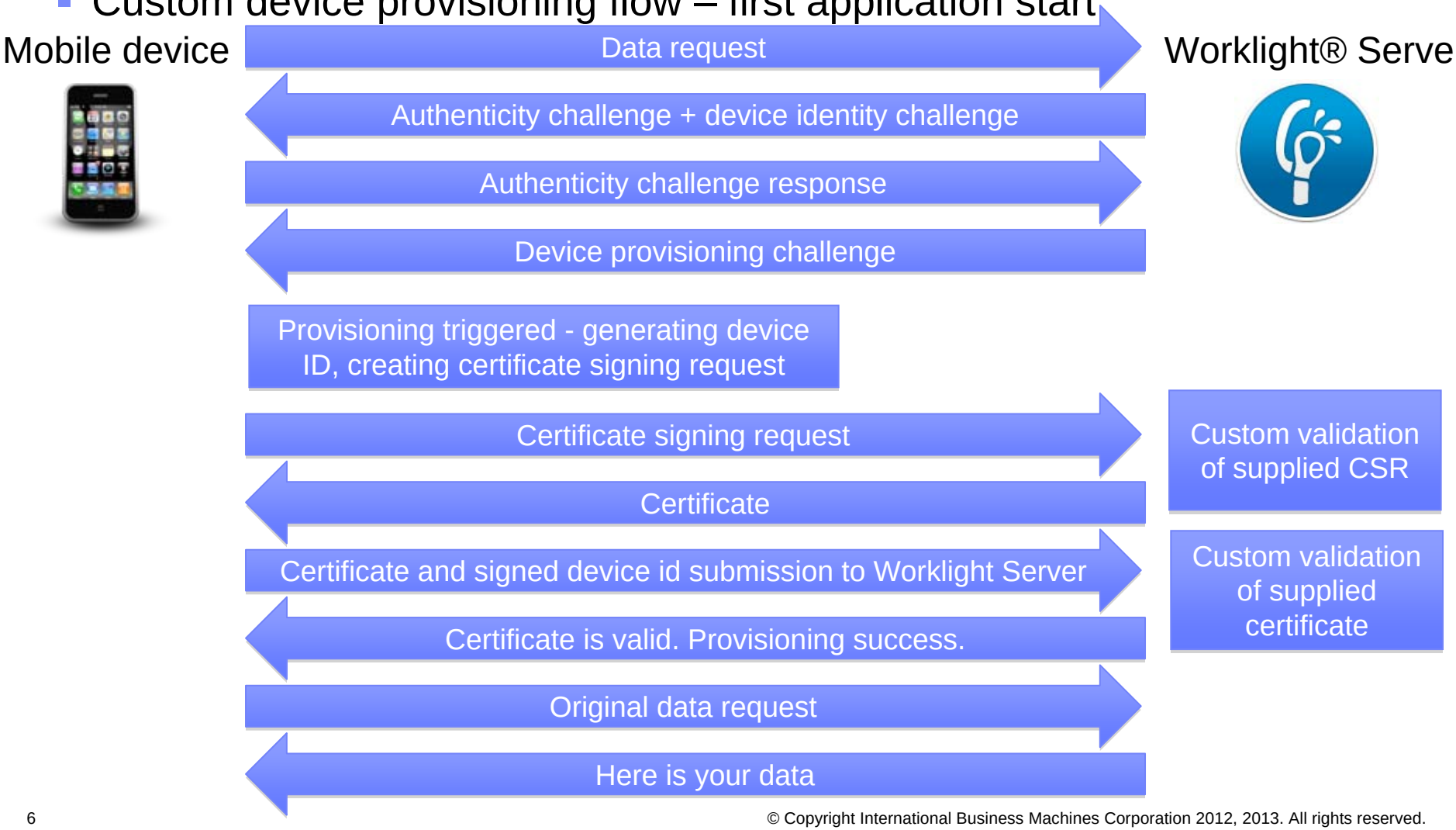
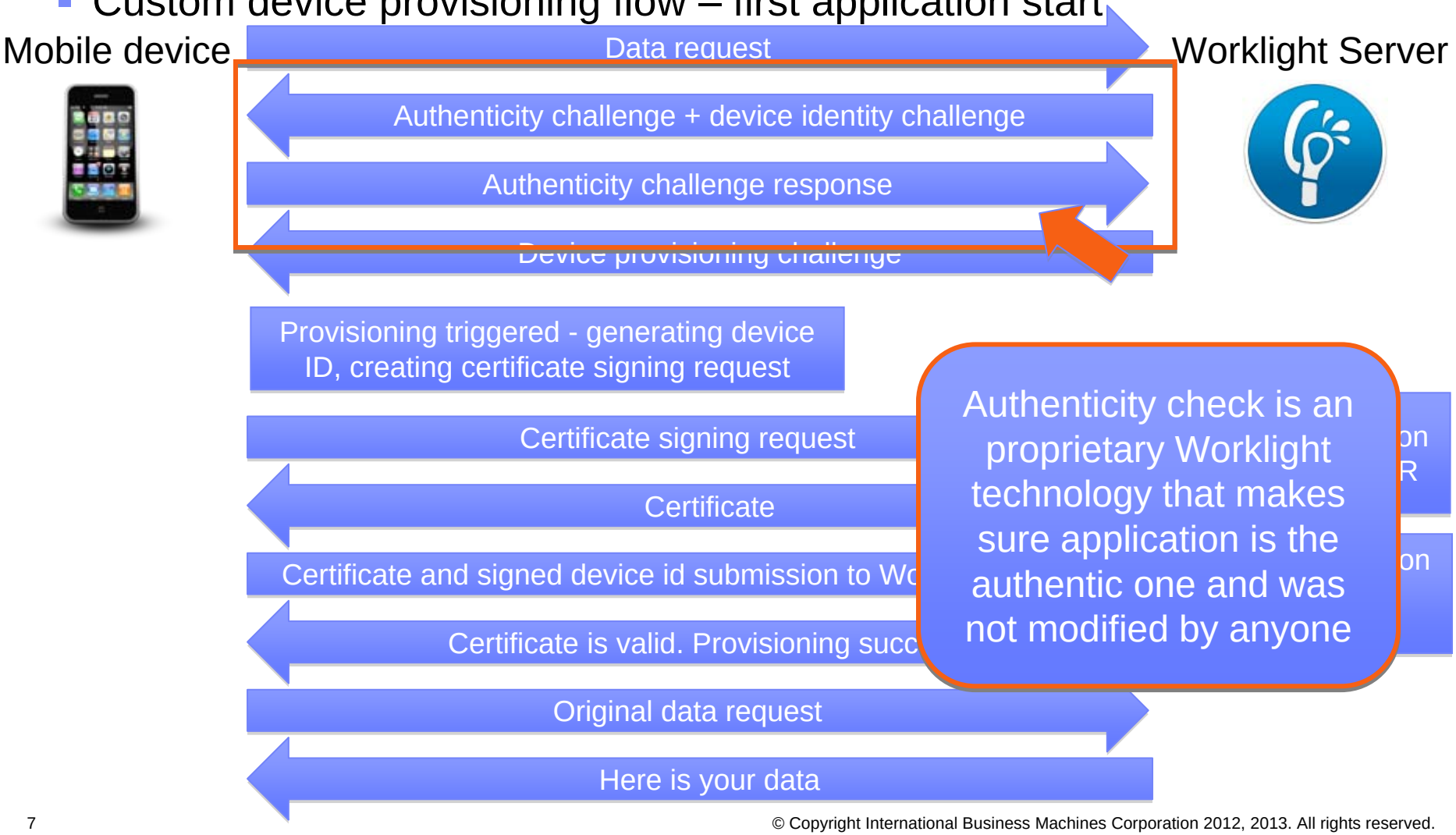
Understanding custom device provisioning (1 of 5)

- Custom device provisioning flow – first application start



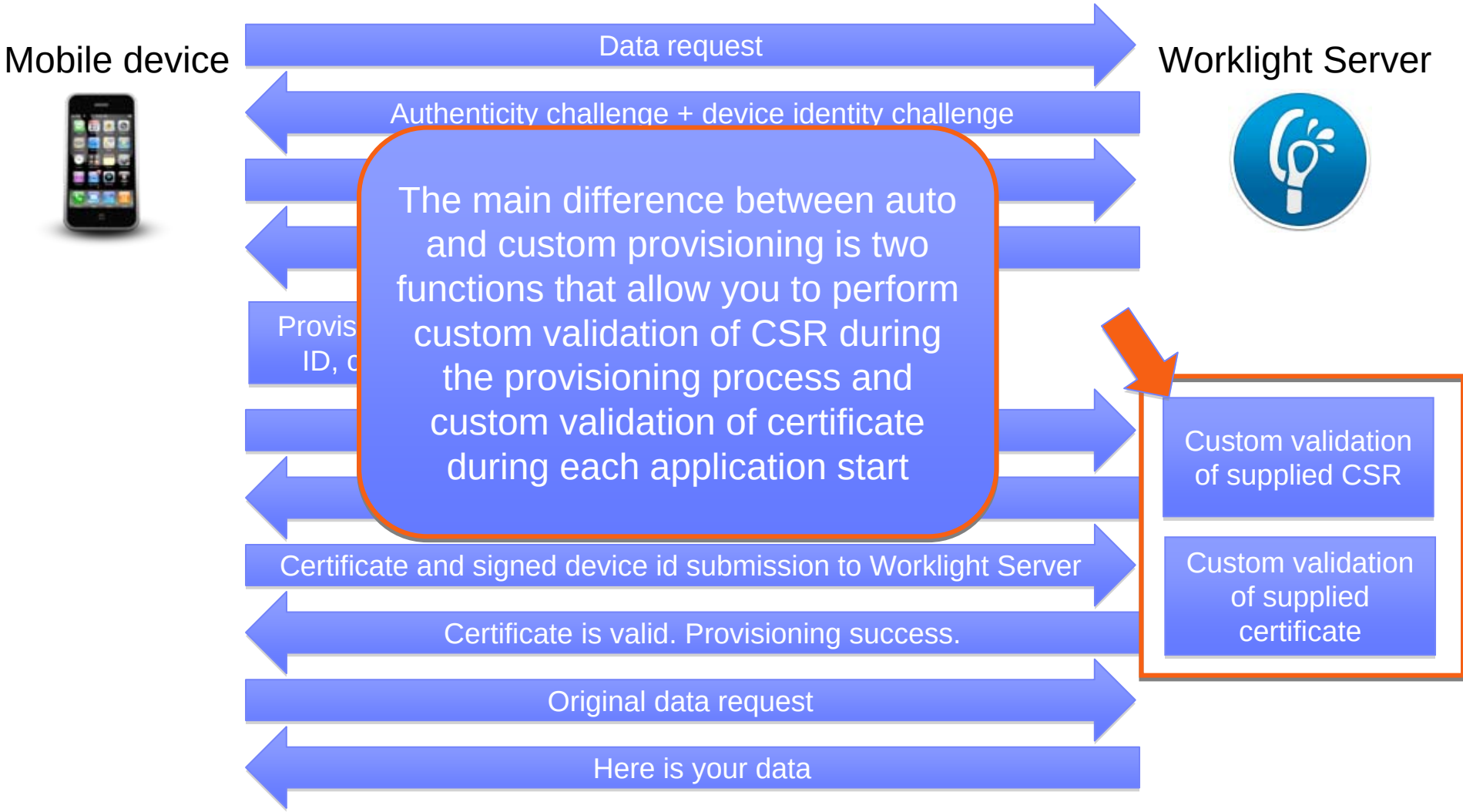
Understanding custom device provisioning (2 of 5)

- Custom device provisioning flow – first application start



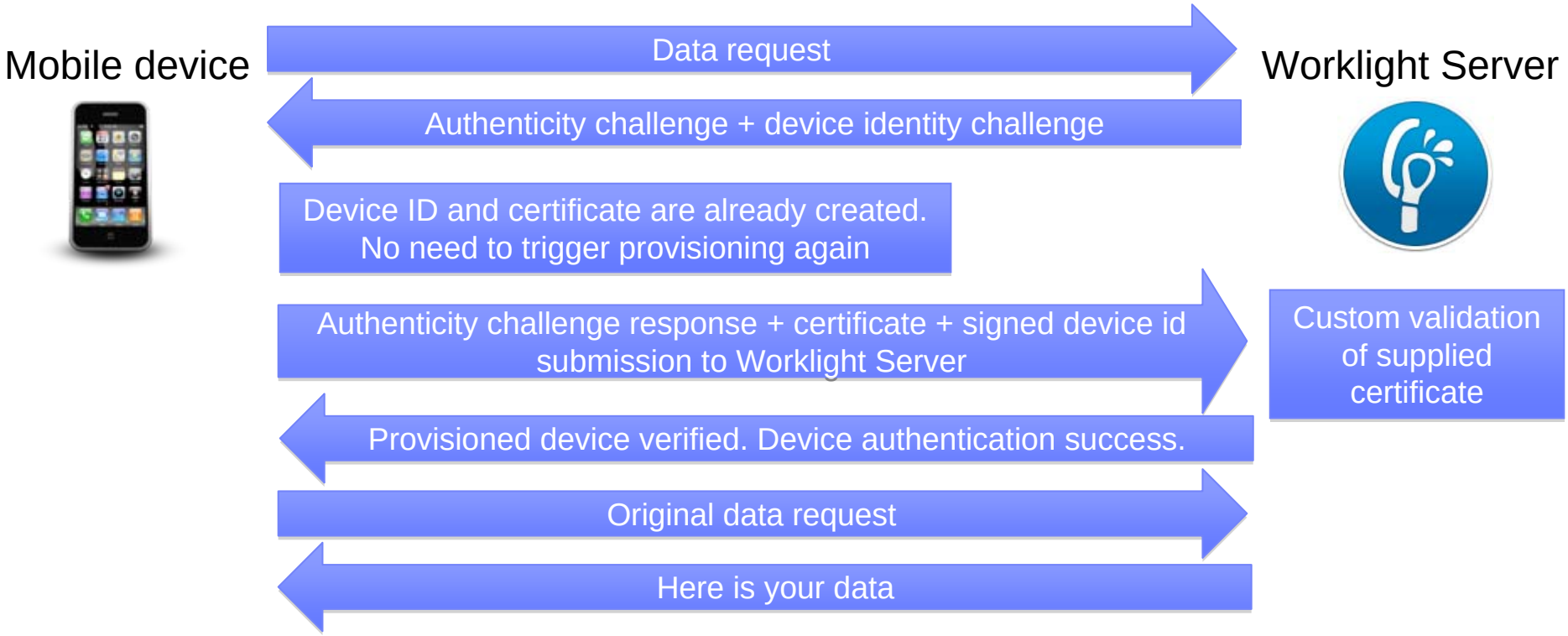
Understanding custom device provisioning (3 of 5)

- Custom device provisioning flow – first application start



Understanding custom device provisioning (4 of 5)

- Custom device provisioning flow – subsequent application start ups



Understanding custom device provisioning (5 of 5)

- By default, the Worklight server uses its internal keystore to issue a certificate
- You can tell the Worklight server to use your own keystore by adjusting the **worklight.properties** file

```
#################################################################################################################
#    Worklight Default Certificate (For device provisioning)
#################################################################################################################
# You can change the default behavior with regard to CA certificates. You can also implement custom provisioning.
# If you want to change the auto-provisioning mechanism to use different granularity (application, device or group) or a
# different list of pre-required realms, you can create your own customized authenticator, login module and challenge handler.
# For more information, see the "Custom Authenticator and Login Module" Getting Started training module.

#The path to the keystore, relative to the server folder in the Worklight Project, for example: conf/my-cert.jks
#wl.ca.keystore.path=
#The type of the keystore file. Valid values are jks or pkcs12.
#wl.ca.keystore.type=
#The password to the keystore file.
#wl.ca.keystore.password=
#The alias of the entry where the private key and certificate are stored, in the keystore.
#wl.ca.key.alias=
#The password to the alias in the keystore.
#wl.ca.key.alias.password=

#################################################################################################################
#    Worklight SSL keystore
#################################################################################################################
#SSL certificate keystore location.
ssl.keystore.path=conf/default.keystore
#SSL certificate keystore type (jks or PKCS12)
ssl.keystore.type=jks
#SSL certificate keystore password.
ssl.keystore.password=worklight
```

- Note that the **wl.ca.keystore.path** property value can be both relative to the Worklight project */server/* folder and absolute to the file system

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Configuring authenticationConfig.xml (1 of 3)

- Start by adding a new realm named **CustomDeviceProvisioningRealm** to the **authenticationConfig.xml** file
- Use **CustomDeviceProvisioningLoginModule**
- Use the auto provisioning authenticator className parameter
- Add a **validate-csr-function** parameter
- The value of this parameter points to an Adapter function that will perform CSR validation

```
<realms>
    <realm name="CustomDeviceProvisioningRealm" loginModule="CustomDeviceProvisioningLoginModule">
        <className>com.worklight.core.auth.ext.DeviceAutoProvisioningAuthenticator</className>
        <parameter  name="validate-csr-function"
                    value="ProvisioningAdapter.validateCSR"/>
    </realm>
</realms>
```

Configuring authenticationConfig.xml (2 of 3)

- Add **CustomDeviceProvisioningLoginModule**
- Use the auto provisioning login module className parameter
- Add a **validate-certificate-function** parameter
- The value of this parameter points to an Adapter function that will perform certificate validation

```
<loginModules>
    <loginModule name="CustomDeviceProvisioningLoginModule">
        <className>com.worklight.core.auth.ext.DeviceAutoProvisioningLoginModule</className>
        <parameter  name="validate-certificate-function"
                    value="ProvisioningAdapter.validateCertificate"/>
    </loginModule>
</loginModules>
```

Configuring authenticationConfig.xml (3 of 3)

- Create a new **mobileSecurityTest**
- Add a mandatory **<testAppAuthenticity/>** test
- Add a mandatory **<testDeviceId/>** test
- Specify **provisioningType="custom"**
- Specify **realm="CustomDeviceProvisioningRealm"**

```
<securityTests>
    <mobileSecurityTest name="CustomDeviceProvisioningSecurityTest">
        <testAppAuthenticity/>
        <testDeviceId provisioningType="custom" realm="CustomDeviceProvisioningRealm"/>
    </mobileSecurityTest>
</securityTests>
```

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Implementing server-side components (1 of 7)

- Create a new adapter named **ProvisioningAdapter**
- Add two functions with following signatures to adapter's JavaScript™ file
  - `validateCSR (clientDN, csrContent)` – this function is invoked only during initial device provisioning. It is used to check whether the device is authorized to be provisioned. Once the device is provisioned, this function will not be invoked again
  - `validateCertificate (certificate, customAttributes)` – this function is invoked every time the mobile application establishes a new session with the Worklight server. It is used to validate that the certificate that the application/device possesses is still valid and that the application/device is allowed to communicate with Worklight Server.
- Note that these functions are called internally by the Worklight authentication framework, therefore you should not declare them in the adapter's XML file

Implementing server-side components (2 of 7)

- Implement `validateCSR (clientDN, csrContent)` function

```
function validateCSR(clientDN, csrContent){
    WL.Logger.log("validateCSR :: clientDN :: " + JSON.stringify(clientDN));
    WL.Logger.log("validateCSR :: csrContent :: " + JSON.stringify(csrContent));

    var activationCode = csrContent.activationCode;
    var response;

    // This is a place to perform validation of csrContent and update clientDN if required.
    // You can do it using adapter backend connectivity
    if (activationCode === "worklight"){
        response = {
            isSuccessful: true,
            clientDN: clientDN + ",CN=someCustomData",
            attributes: {
                customAttribute: "some-custom-attribute"
            }
        };
    } else {
        response = {
            isSuccessful: false,
            errors: ["Invalid activation code"]
        };
    }

    return response;
}
```

activationCode is a custom property that you add to CSR on the client side.

Implementing server-side components (3 of 7)

- Implement `validateCSR (clientDN, csrContent)` function

```
function validateCSR(clientDN, csrContent){
    WL.Logger.log("validateCSR :: clientDN :: " + JSON.stringify(clientDN));
    WL.Logger.log("validateCSR :: csrContent :: " + JSON.stringify(csrContent));

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    var response;

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    // You can do it using adapter backend connectivity
    if (activationCode === "worklight"){
        response = {
            isSuccessful: true,
            clientDN: clientDN + ",CN=someCustomData",
            attributes: {
                customAttribute: "some-custom-attribute"
            }
        };
    } else {
        response = {
            isSuccessful: false,
            errors: ["Invalid activation code"]
        };
    }

    return response;
}
```

Adapter functionality, for example accessing http web services, can be used to validate CSR information. For simplicity we just check that **activationCode** is equal to a predefined hardcoded string

Implementing server-side components (4 of 7)

- Implement `validateCSR (clientDN, csrContent)` function

```
function validateCSR(clientDN, csrContent){
    WL.Logger.log("validateCSR :: clientDN :: " + JSON.stringify(clientDN));
    WL.Logger.log("validateCSR :: csrContent :: " + JSON.stringify(csrContent));

    var activationCode = csrContent.activationCode;
    var response;

    // This is a place to perform validation of csrContent and update clientDN if required.
    // You can do it using adapter backend connectivity
    if (activationCode === "worklight"){
        response = {
            isSuccessful: true,
            clientDN: clientDN + ",CN=someCustomData",
            attributes: {
                customAttribute: "some-custom-attribute"
            }
        };
    } else {
        response = {
            isSuccessful: false,
            errors: ["Invalid activation code"]
        };
    }

    return response;
}
```

If CSR validation was successful, the **validateCSR** function returns a **clientDN** (note that it can be modified with additional custom data). In addition, it is possible to specify custom **attributes** to be saved in certificate. Once **isSuccessful:true** is returned from the **validateCSR** function, the Worklight server will generate a certificate and return it to the application

Implementing server-side components (5 of 7)

- Implement `validateCSR (clientDN, csrContent)` function

```
function validateCSR(clientDN, csrContent){
    WL.Logger.log("validateCSR :: clientDN :: " + JSON.stringify(clientDN));
    WL.Logger.log("validateCSR :: csrContent :: " + JSON.

    var activationCode = csrContent.activationCode;
    var response;

    // This is a place to perform validation of csrConter
    // You can do it using adapter backend connectivity
    if (activationCode === "worklight"){
        response = {
            isSuccessful: true,
            clientDN: clientDN + ",CN=someCustomData",
            attributes: {
                customAttribute: "some-custom-attribute"
            }
        };
    } else {
        response = {
            isSuccessful: false,
            errors: ["Invalid activation code"]
        };
    }

    return response;
}
```

If CSR validation fails, you must return **isSuccessful:false** and supply an error message

Implementing server-side components (6 of 7)

- Implement `validateCertificate (certificate, customAttributes)` function

```
function validateCertificate(certificate,customAttributes){
    WL.Logger.log("validateCertificate :: certificate :: " + JSON.stringify(certificate));
    WL.Logger.log("validateCertificate :: customAttributes :: " + JSON.stringify(customAttributes));

    // Additional custom certificate validations can be performed here.

    return {
        isSuccessful: true
    };
}
```

You can perform certificate validations according to your custom rules here. Adapter functionality, for example accessing http web services, can be used to validate the certificate. If the certificate is valid, you must return **isSuccessful:true**

Implementing server-side components (7 of 7)

- Implement `validateCertificate (certificate, customAttributes)` function

```
function validateCertificate(certificate,customAttributes){
    WL.Logger.log("validateCertificate :: certificate :: " + JSON.stringify(certificate));
    WL.Logger.log("validateCertificate :: customAttributes :: " + JSON.stringify(customAttributes));

    // Additional custom certificate validations can be performed here.

    return {
        isSuccessful: true
    };
}
```

Note that returning **isSuccessful:false** means that application cannot operate and the only thing that can be done is to reinstall the application so it can be provisioned again

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Implementing client-side components (1 of 10)

- Create a new application, add iPhone/iPad/Android environment to it
- Add security test created in previous steps to protect created environment

```
<iphone bundleId="com.CustomProvisioningApp" securityTest="CustomDeviceProvisioningSecurityTest" version="1.0" >
    <worklightSettings include="true"/>
    <security>
        <encryptWebResources enabled="false"/>
        <testWebResourcesChecksum enabled="false" ignoreFileExtensions="png, jpg, jpeg, gif, mp4, mp3"/>
    </security>
</iphone>
```

- In case it is required, configure your application for Application Authenticity test as described in the *Application Authenticity Protection* training module

Implementing client-side components (2 of 10)

- Update application HTML file

```
<body id="content" style="display: none;">

    <div id="AppBody">
        <div class="header">
            <h1>CustomProvisioningApp</h1>
        </div>
        <div id="wrapper">
            Device authentication with custom device provisioning was not complete
        </div>
        <button id="connectToServerButton">
            Connect to Worklight server
        </button>
    </div>

    <div id="ProvBody" style="display: none">
        <div id="provisioningError"></div>
        <input id="provisioningCode" placeholder="Enter code" type="text" />
        <button id="submitProvCodeButton">Send</button>
    </div>

    <script src="js/initOptions.js"></scri
    <script src="js/CustomProvisioningApp.
    <script src="js/messages.js"></script>
    <script src="js/CustomDeviceProvisioni
</body>
```

AppBody element holds application content. **ProvBody** element holds device provisioning-related content. Note the **connectToServerButton** in **AppBody**

Implementing client-side components (3 of 10)

- Add listener to **connectToServerButton**
- Use `WL.Client.connect()` API to connect to the Worklight Server

```
function wlCommonInit(){
    $("#connectToServerButton").click(function(){
        WL.Client.connect();
    });
}
```

Implementing client-side components (4 of 10)

- Add a new **CustomDeviceProvisioningRealmChallengeHandler.js** file and reference it from main HTML file
- Device provisioning challenge handler requires following methods to be implemented
  - **handler.createCustomCsr (challenge) –** This method is responsible for returning custom properties that will be added to CSR. Here you add a custom **activationCode** property, which is used in the adapter's **validateCSR** function in previous slides. Note that this method is asynchronous to allow collecting custom properties via native code or separate flow
  - **handler.processSuccess(identity) –** This method is invoked when certificate validation is successfully completed using the **validateCertificate** adapter function you implemented earlier
  - **handler.handleFailure() –** This method is invoked when certificate validation fails (**isSuccessful:false** is returned from **validateCertificate** function).

Implementing client-side components (5 of 10)

- Implement device provisioning challenge handler

```
var customDevProvChallengeHandler =
    WL.Client.createProvisioningChallengeHandler("CustomDeviceProvisioningRealm");

customDevProvChallengeHandler.createCustomCsr = function(challenge){
    WL.Logger.debug("createCustomCsr :: " + JSON.stringify(challenge));

    $("#AppBody").hide();
    $("#ProvBody").show();
    $("#provisioningCode").val("");

    if (challenge.error) {
        $("#provisioningError").html(new D
    } else {
        $("#provisioningError").html(new D
    }

    $("#submitProvCodeButton").click(funct
        var customCsrProperties = {
            activationCode: $("#provisioni
        };
        customDevProvChallengeHandler.subm
    });
};
```

Create device provisioning challenge handler by using the WL.Client.createProvisioningChallengeHandler() API. Specify realm name as parameter

Implementing client-side components (6 of 10)

- Implement device provisioning challenge handler

```
var customDevProvChallengeHandler =
    WL.Client.createProvisioningChallengeHandler("CustomDeviceProvisioningRealm");

customDevProvChallengeHandler.createCustomCsr = function(challenge){
    WL.Logger.debug("createCustomCsr :: " + JSON.stringify(challenge));

    $("#AppBody").hide();
    $("#ProvBody").show();
    $("#provisioningCode").val("");

    if (challenge.error) {
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    } else {
        $("#provisioningError").html(new D
    }

    $("#submitProvCodeButton").click(funct
        var customCsrProperties = {
            activationCode: $("#provisioni
        };
        customDevProvChallengeHandler.subm
    });
};
```

When Worklight Server triggers device provisioning, the **createCustomCsr** function is invoked. Use it to manipulate your UI, for example to hide the application screen and show device provisioning-related components

Implementing client-side components (7 of 10)

- Implement device provisioning challenge handler

```
var customDevProvChallengeHandler =
    WL.Client.createProvisioningChallengeHa

customDevProvChallengeHandler.createCustomC
    WL.Logger.debug("createCustomCsr :: " +

    $("#AppBody").hide();
    $("#ProvBody").show();
    $("#provisioningCode").val("");

    if (challenge.error) {
        $("#provisioningError").html(new Date() + " " + challenge.error);
    } else {
        $("#provisioningError").html(new Date() + " Enter activation code.");
    }

    $("#submitProvCodeButton").click(function(){
        var customCsrProperties = {
            activationCode: $("#provisioningCode").val()
        };
        customDevProvChallengeHandler.submitCustomCsr(customCsrProperties, challenge);
    });
};
```

You can use information returned in authentication challenge, for example, error messages

Implementing client-side components (8 of 10)

- Implement device provisioning challenge handler

```
var customDevProvChallengeHandler =
    WL.Client.createProvisioningChallengeHa

customDevProvChallengeHandler.createCustomC
    WL.Logger.debug("createCustomCsr :: " +

    $("#AppBody").hide();
    $("#ProvBody").show();
    $("#provisioningCode").val("");

    if (challenge.error) {
        $("#provisioningError").html(new Date() + " " + challenge.error);
    } else {
        $("#provisioningError").html(new Date() + " Enter activation code.");
    }

    $("#submitProvCodeButton").click(function(){
        var customCsrProperties = {
            activationCode: $("#provisioningCode").val()
        };
        customDevProvChallengeHandler.submitCustomCsr(customCsrProperties, challenge);
    });
};
```

When required custom properties are collected, invoke the **submitCustomCsr()** API. Note that adding custom properties to CSR is optional. If you do not want to add custom properties supply empty JSON object as a parameter

Implementing client-side components (9 of 10)

- Implement device provisioning challenge handler

```
customDevProvChallengeHandler.processSuccess = function(identity) {
    WL.Logger.debug("processSuccess :: " + JSON.stringify(identity));
    $("#connectToServerButton").hide();
    $("#AppBody").show();
    $("#ProvBody").hide();
    $("#wrapper").text("Device authentication with custom device provisioning "+
            "was successfully complete");
};

customDevProvChallengeHandler.handleFailure = function(){
    WL.Logger.debug("handleFailure");
    $("#AppBody").show();
    $("#ProvBody").hide();
    $("#wrapper").text("Server has reje
            "reinstall the application
};
```

processSuccess function is called each time the certificate successfully passes validation. You can use it for UI manipulations

Implementing client-side components (10 of 10)

- Implement device provisioning challenge handler

```
customDevProvChallengeHandler.processSu
    WL.Logger.debug("processSuccess ::
    $("#connectToServerButton").hide();
    $("#AppBody").show();
    $("#ProvBody").hide();
    $("#wrapper").text("Device authenti
            "was successfully complete"
};

customDevProvChallengeHandler.handleFailure = function(){
    WL.Logger.debug("handleFailure");
    $("#AppBody").show();
    $("#ProvBody").hide();
    $("#wrapper").text("Server has rejected your device. You will need to "+
            "reinstall the application and perform device provisioning again.");
};
```

handleFailure function is called each time the certificate fails validation. You can use it for UI manipulations and to notify the user that the application will not be able to connect to Worklight Server

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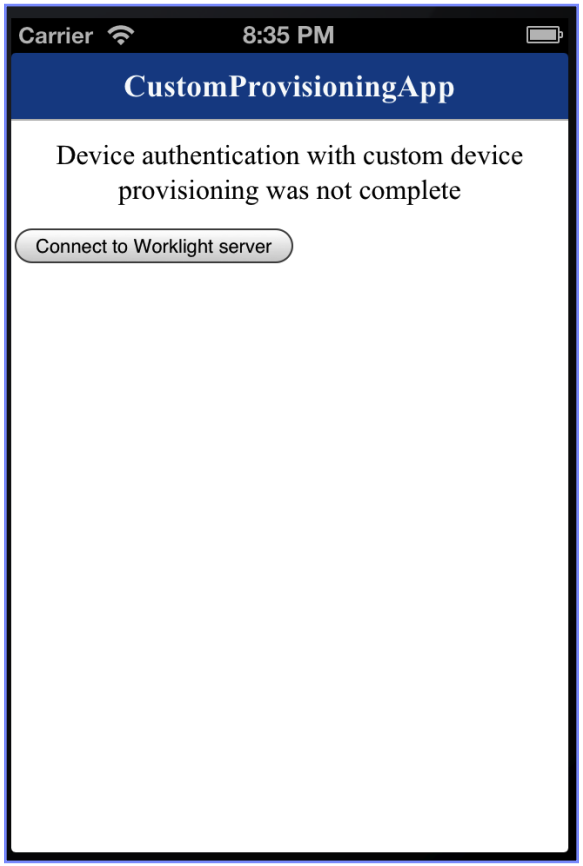

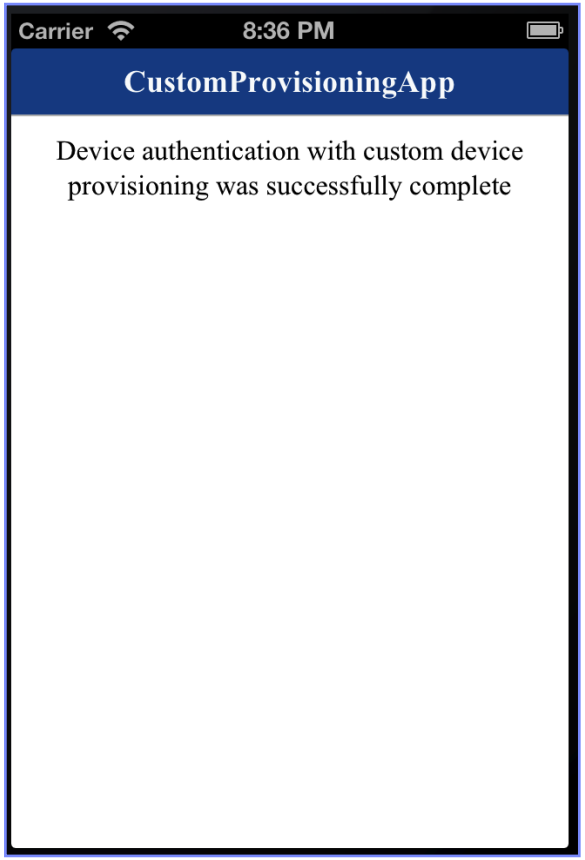

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