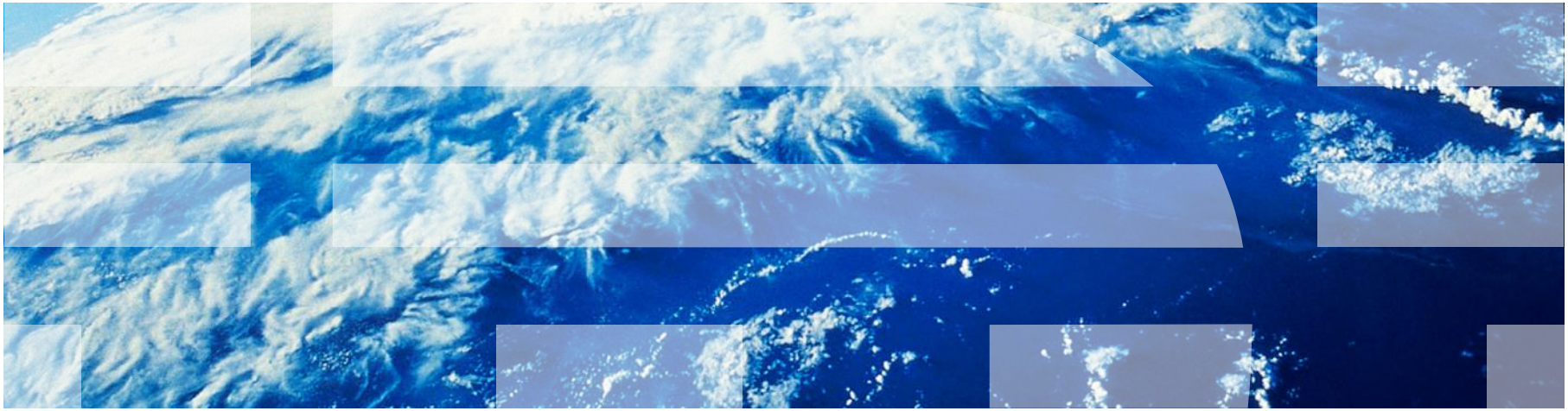
IBM Worklight Foundation V6.2.0
Getting Started

Custom device provisioning



20 June 2014

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

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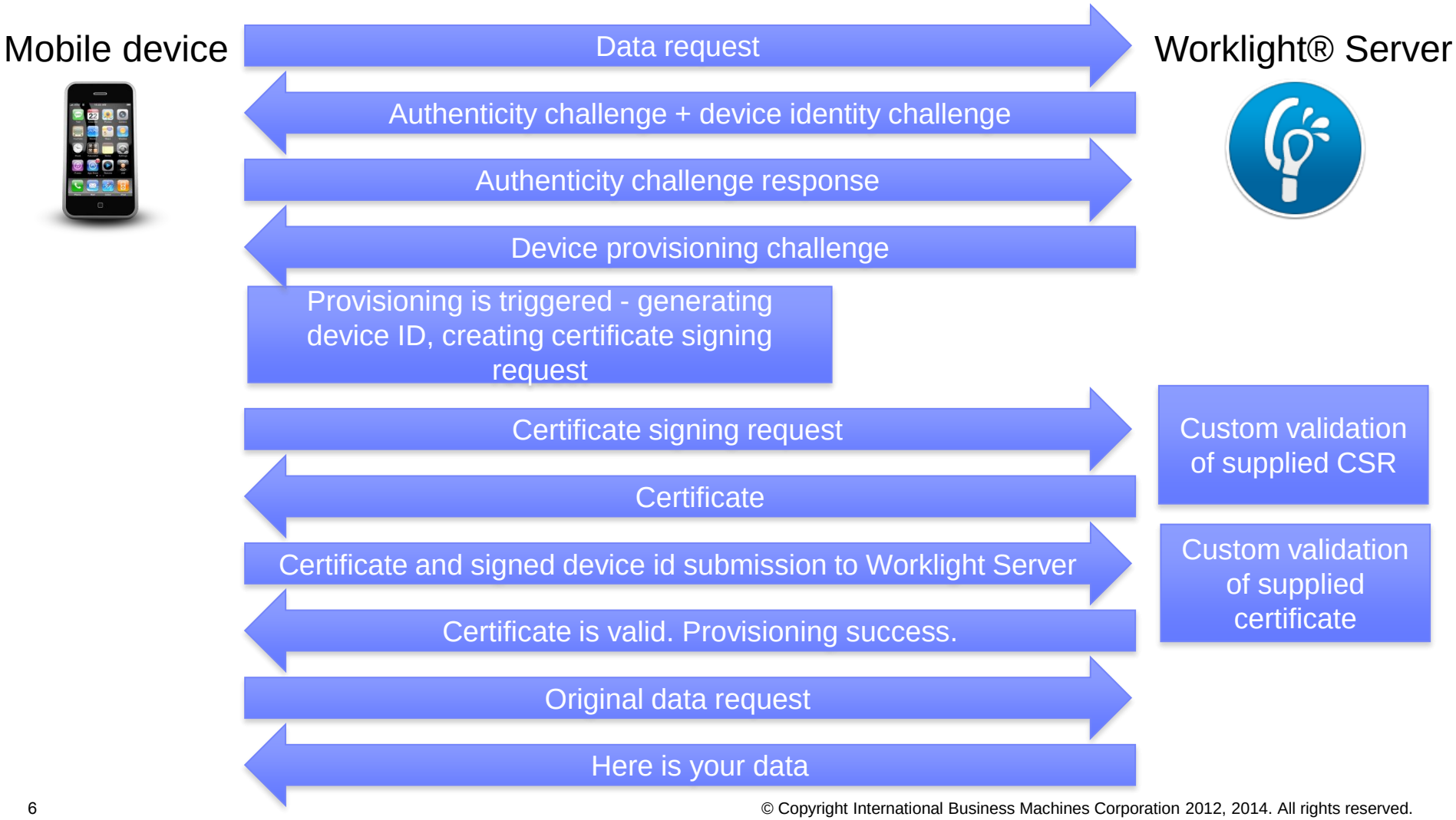
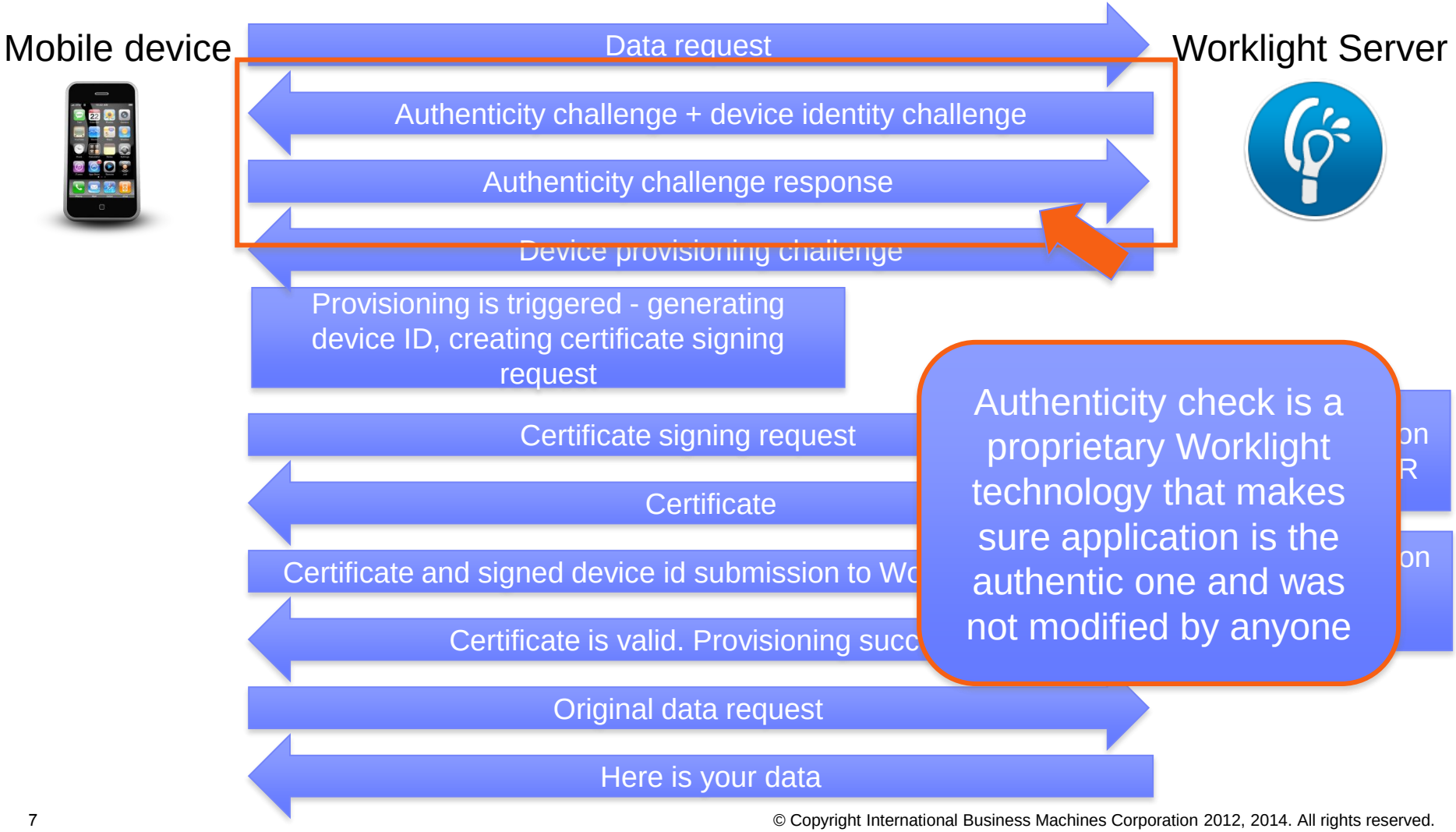
Understanding custom device provisioning (1 of 5)

- Custom device provisioning flow – first application start.



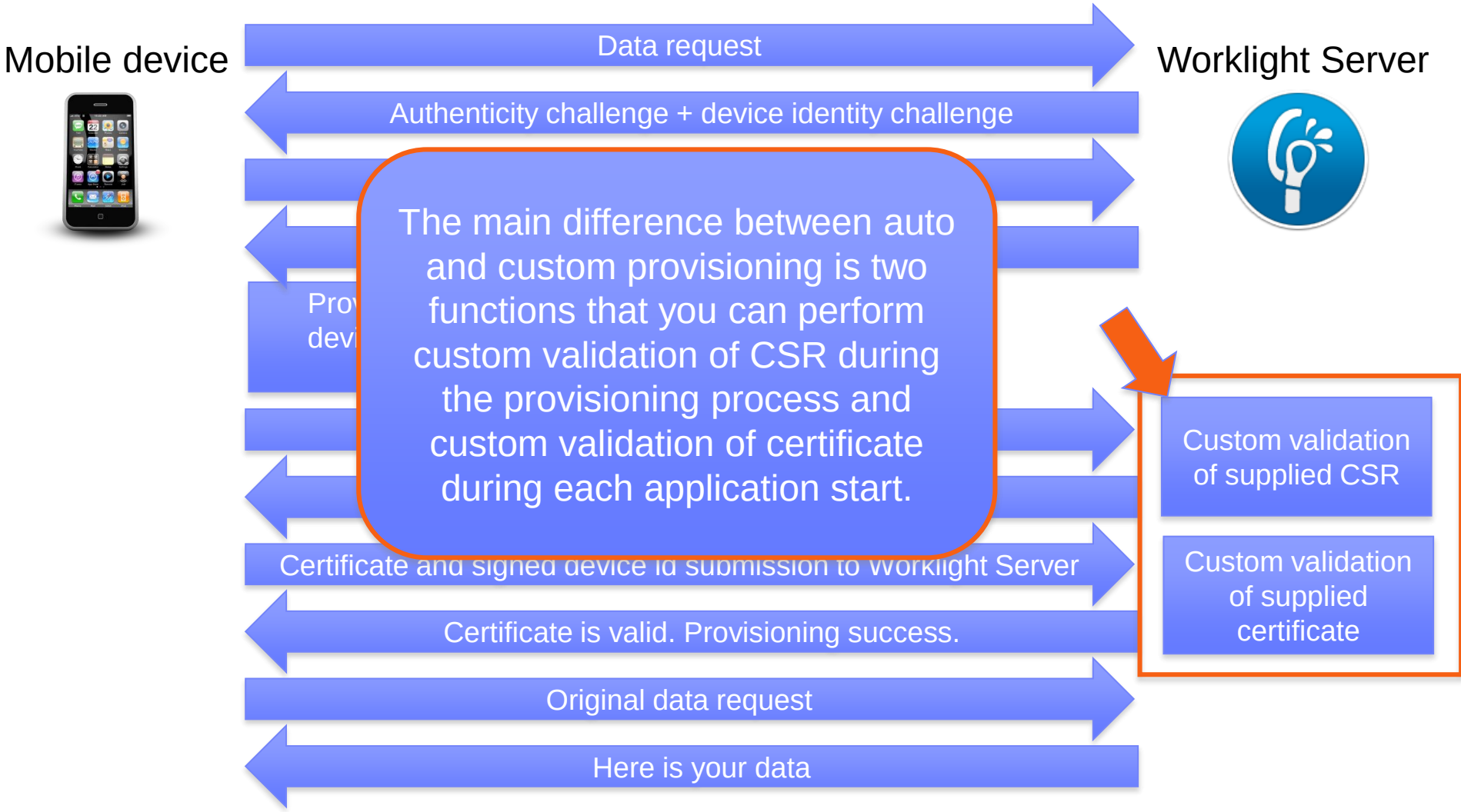
Understanding custom device provisioning (2 of 5)

- Custom device provisioning flow – first application start.



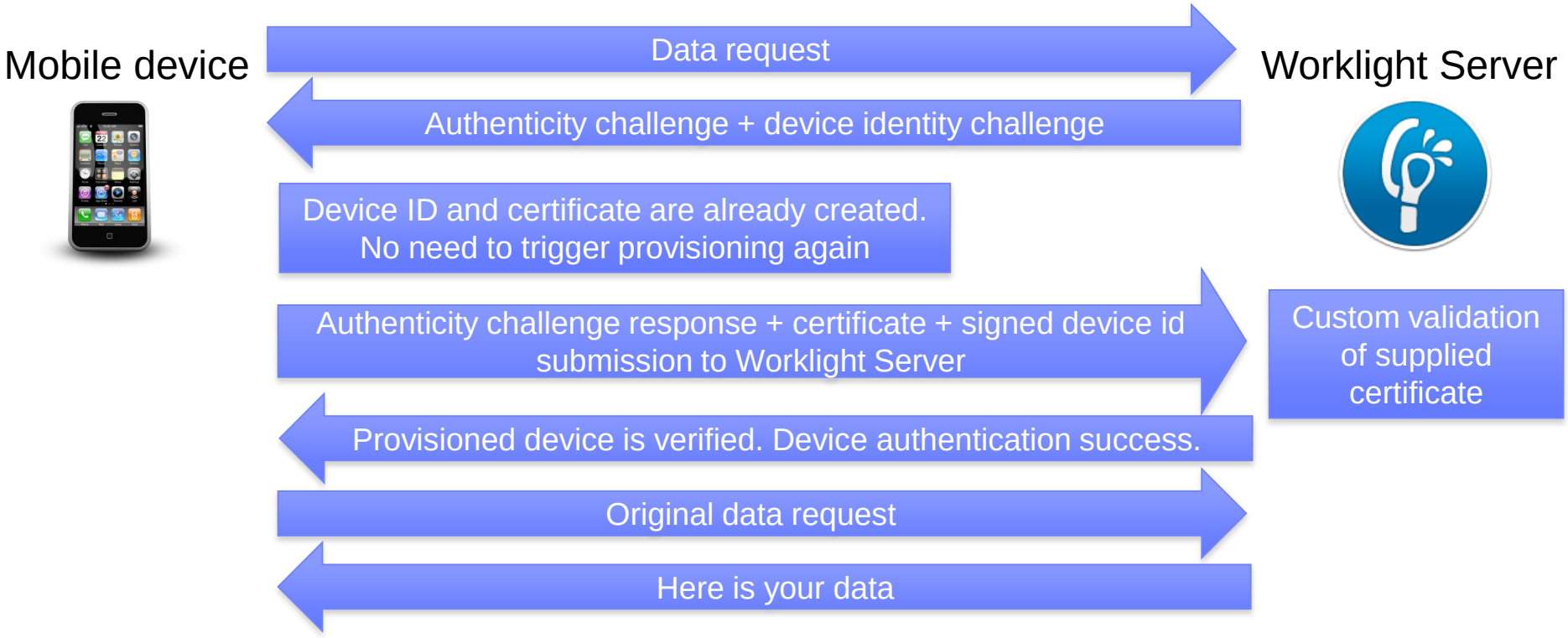
Understanding custom device provisioning (3 of 5)

- Custom device provisioning flow – first application start.



Understanding custom device provisioning (4 of 5)

- Custom device provisioning flow – subsequent application starts.



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:** The `wl.ca.keystore.path` property value can be either relative to the `/server/` folder of Worklight project or absolute to the file system.

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Configuring authenticationConfig.xml (1 of 3)

- Start by adding a realm that is 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 performs 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 performs 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 **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 an adapter that is named **ProvisioningAdapter**.
- Add two functions with following signatures to the JavaScript™ file of the adapter.
  - `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 is not invoked again.
  - `validateCertificate (certificate, customAttributes)` – this function is invoked every time that 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.
- These functions are called internally by the Worklight authentication framework. Therefore, do not declare them in the XML file of the adapter XML file.

Implementing server-side components (2 of 7)

- Implement `validateCSR (clientDN, csrContent)` function.

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

    var activationCode = csrContent.activationCode;
    var response;

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    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 access http web services, can be used to validate CSR information. For simplicity, the `activationCode` is checked whether it 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.info("validateCSR :: clientDN :: " + JSON.stringify(clientDN));
    WL.Logger.info("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 is successful, the `validateCSR` function returns a `clientDN` (note that it can be modified with more 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 generates 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.info("validateCSR :: clientDN :: " + JSON.stringify(clientDN));
    WL.Logger.info("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 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.info("validateCertificate :: certificate :: " + JSON.stringify(certificate));
    WL.Logger.info("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 access 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.info("validateCertificate :: certificate :: " + JSON.stringify(certificate));
    WL.Logger.info("validateCertificate :: customAttributes :: " + JSON.stringify(customAttributes));

    // Additional custom certificate validations can be performed here.

    return {
        isSuccessful: true
    };
}
```

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 an application, add iPhone/iPad/Android environment to it.
- Add security test that is 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 style="display: none;">
    <div id="header">
        <h1>Custom Provisioning Application</h1>
    </div>

    <div id="wrapper">
        <div id="AppBody">
            <p id="beforeProv">
                Device authentication with custom device provisioning was not complete
                <button id="connectToServerButton" class="appButton">Connect to Worklight server</button>
            </p>
            <p id="provisioningError" style="display: none"></p>
        </div>

        <div id="ProvBody" style="display: none">
            <p id="provisioningError">
                <input id="provisioningCode" placeholder="Enter code" type="text" />
                <button id="submitProvCodeButton" class="formButton">Send</button>
            </p>
        </div>
    </div>
    <script src="js/initOptions.js"></script>
    <script src="js/main.js"></script>
    <script src="js/messages.js"></script>
    <script src="js/CustomDeviceProvisioningRealmChalleng
</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 `CustomDeviceProvisioningRealmChallengeHandler.js` file and reference it in the 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 are added to CSR. Here you add a custom **activationCode** property, which is used in the adapter's `validateCSR` function in previous slides. 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 by using the `validateCertificate` adapter function that 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 Date() + " " + challenge.error);
    } else {
        $("#provisioningError").html(new Date() + " Enter activation code.");
    }

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

    $("#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 that is 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. 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 rejec
            "reinstall the application a
};
```

`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.processSuc
    WL.Logger.debug("processSuccess :: "
    $("#connectToServerButton").hide();
    $("#AppBody").show();
    $("#ProvBody").hide();
    $("#wrapper").text("Device authentic
            "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 that the certificate fails validation. You can use it for UI manipulations and to notify the user that the application cannot connect to Worklight Server.

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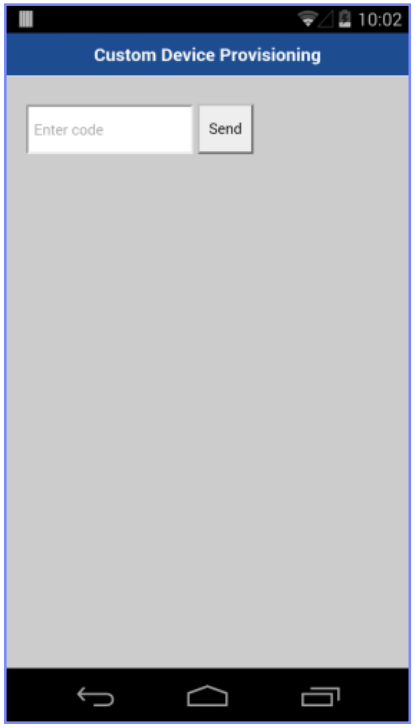

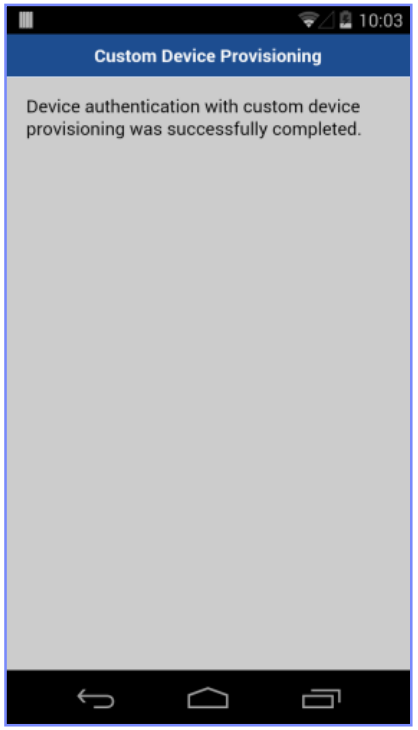

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