Oracle® Banking APIs

Security Guide

Release 25.1.0.0.0
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Oracle Banking APIs Security Guide, Release 25.1.0.0.0

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Preface

Purpose

This guide is designed to help acquaint you with the Oracle Banking Digital Experience application. This guide provides answers to specific features and procedures that the user need to be aware of the module to function successfully.

Audience

This document is intended for the following audience:

- Customers
- Partners

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

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Oracle customer access to and use of Oracle support services will be pursuant to the terms and conditions specified in their Oracle order for the applicable services.

Critical Patches

Oracle advises customers to get all their security vulnerability information from the Oracle Critical Patch Update Advisory, which is available at Critical Patches, Security Alerts and

Bulletins. All critical patches should be applied in a timely manner to ensure effective security, as strongly recommended by Oracle Software Security Assurance.

Diversity and Inclusion

Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our products and documentation. We are also mindful of the necessity to maintain compatibility with our customers' existing technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Related Resources

For more information on any related features, refer to the following documents:

- Oracle Banking APIs Installation Manuals

Screenshot Disclaimer

Personal information used in the interface or documents is dummy and does not exist in the real world. It is only for reference purposes.

Acronyms and Abbreviations

The list of the acronyms and abbreviations used in this guide are as follows:

Table 1 Acronyms and Abbreviations

Abbreviation	Description
OBAPI	Oracle Banking APIs

1

General Security Principles

The following principles are fundamental for using any application securely.

- Restrict Network Access to Critical Services
- Follow the Principle of Least Privilege
- Monitor System Activity
- Keep Up To Date on Latest Security Information

1.1 Restrict Network Access to Critical Services

Keep both the Oracle Banking Digital Experience middle-tier and the database behind a firewall. In addition, place a firewall between the middle-tier and the database. The firewalls provide assurance that access to these systems is restricted to a known network route, which can be monitored and restricted, if necessary. As an alternative, a firewall router substitutes for multiple, independent firewalls.

If firewalls cannot be used, be certain to configure the TNS Listener Valid Node Checking feature which restricts access based upon IP address. Restricting database access by IP address often causes application client or server programs to fail for DHCP clients. To resolve this, consider using static IP addresses, a software or a hardware VPN or Windows Terminal Services or its equivalent.

1.2 Follow the Principle of Least Privilege

The principle of least privilege states that users should be given the least amount of privilege to perform their jobs. User privileges should be reviewed periodically to determine relevance to current job responsibilities.

1.3 Monitor System Activity

System security largely depends on the following practices:

- Good security protocols
- Proper system configuration
- System monitoring

The system needs to be constantly monitored from a monitoring tool.

1.4 Keep Up To Date on Latest Security Information

Oracle continually improves its software and documentation. It is recommended to keep your software updated.

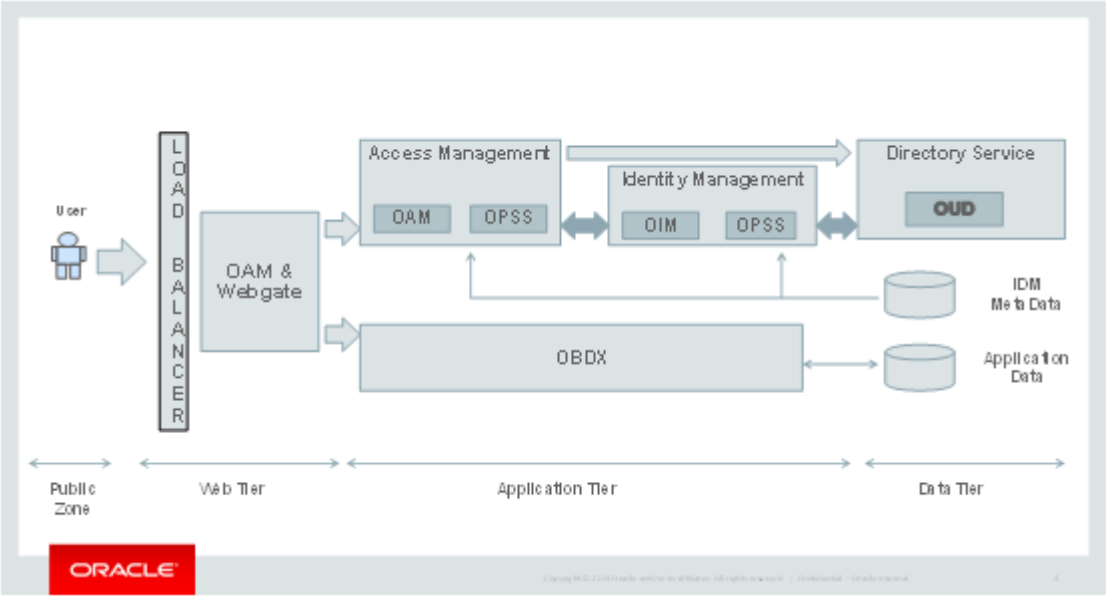
2

Secure Installation and Configuration

This chapter provides an overview of the architecture of the deployment and describes the installation and configuration procedure for Oracle Banking APIs.

Please note that this is only a guide to securing the Oracle Banking APIs application and does not replace periodic reviews of the security architecture of the entire ecosystem of multiple applications maintained by the customer. The guidance provided in this document must always be augmented by specific understanding of the security considerations of the specific deployment architecture.

2.1 Architecture Diagram



2.2 Installing WebLogic

Installation of WebLogic Server can be done by referring to the documentation published at

`https://docs.oracle.com/en/middleware/fusion-middleware/weblogic-server/14.1.2/index.html`

2.3 Configuring SSL

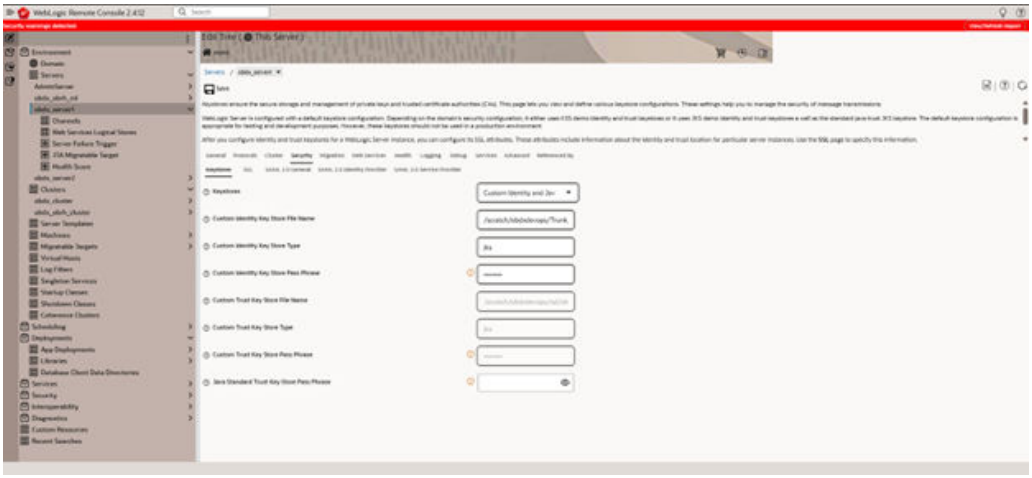
One way SSL between the presentation tier and the application on WebLogic server is supported. The detailed configuration is explained below:

> **Note:**
>
> Procure an external CA signed certificate before proceeding further. Follow the instructions below to install the certificate once the certificate is available.

1. Import the Certificate into a Java Trust Keystore.
   Execute the following command:

   ```
   keytool -import -trustcacerts -alias sampletrustself -keystore
   SampleTrust.jks
   -file SampleSelfCA.cer.der -keyalg RSAkeytool -import -alias `hostname -f`
   -file
   `hostname -f`.cer -keystore <JAVA_HOME>/jre/lib/security/cacerts -
   storepass changeit -noprompt
   ```

2. Configure Application Domain's WebLogic with Custom Identity and Trust Keystores.
   a. Open the WebLogic admin console and navigate to
      Home → Edit tree à Environment àservers → <Server_Name>.
   b. Click the **Security** → **Keystores** tab.

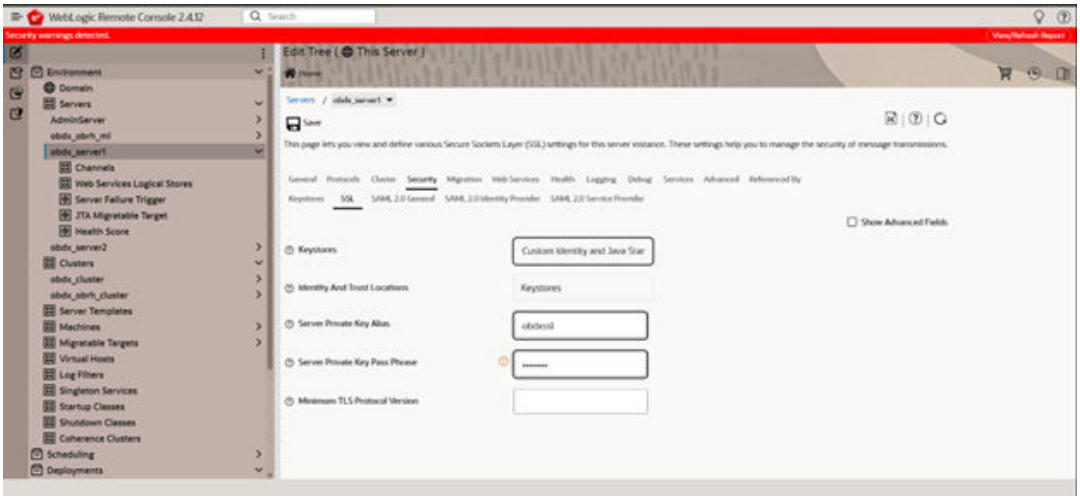


- Click the **Dropdown** button.
- Select Custom Identity and Java Standard Trust option from the list.
- Click the **Save** button.
- Enter the following details in the **Identity** and **Trust** sections:
  Details in the **Identity** and **Trust** sections

Field	Value
Custom Identity Keystore	Absolute path of the custom keystore
Custom Identity Keystore Type	JCEKS
Custom Identity Keystore Passphrase	<Passphrase>
Confirm Custom Identity KeyStore Passphrase	<Re-enter the same Passphrase>

Enter the passphrases that were used while creating the custom Identity Keystore and certificate.

1. Click the **Save** button.
2. Click the **SSL** Tab.



Enter the following details in the **Identity** section:

Field	Value
Private Key Alias	<Alias>
Private Key Passphrase	<Passphrase>
Confirm Private Key Passphrase	<Re-enter passphrase>

a. Enter the passphrases that were used while creating the certificate.

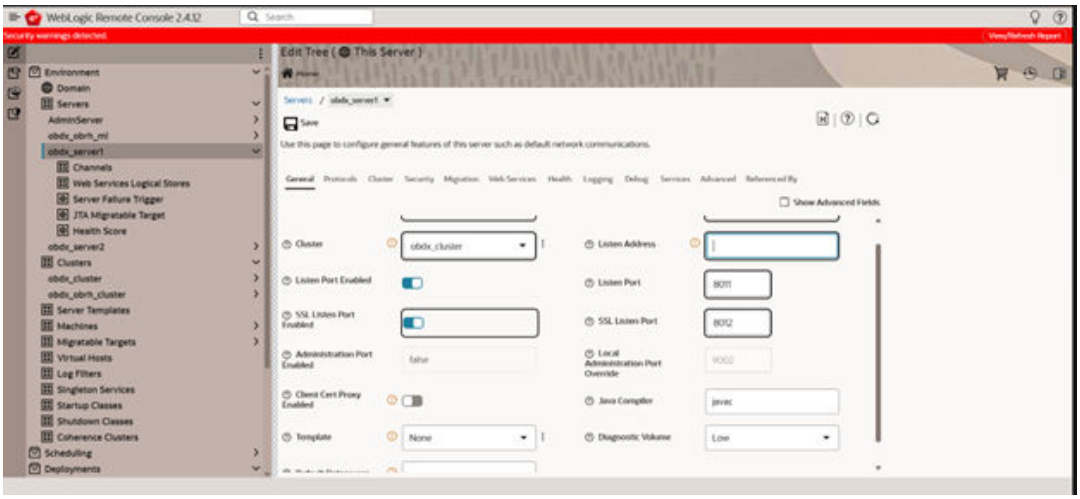
b. Click the **Save** button.

c. Click the **Advanced** link.

d. Ensure that **Two Way Client Cert Behavior** is set to **Client Certs Not Requested**.

3. Click the **General** tab.

4. Select the **SSL Listen Port Enabled** check box.



5. Click the **Save** button.

2.4 Disable SSLv3

By default, SSLv3 should be disabled.

Specifying the `weblogic.security.SSL.protocolVersion` system property in a command-line argument that starts the WebLogic Server lets you specify the protocol that is used for SSL connections.

The following command-line arguments can be specified so that WebLogic Server supports only TLS connections:

```
- Dweblogic.security.SSL.protocolVersion=TLS1
```

> **Note:**
>
> If you don't specify the above property, WebLogic assumes SSLv3 by default.

2.5 HTTP Response Header Configurations

The following are some HTTP Response Headers that mitigate certain vulnerabilities.

Vulnerability	HTTP Response Header
Clickjacking	X-Frame-Options
XSS	Content-Security-Policy
	X-XSS-Protection
Cookie hijacking Protocol Downgrade attacks	Strict-Transport-Security
Retrieving Sensitive data from browser cache	Cache-Control

The sections below specify how to configure these response headers in the httpd.conf file of the web server.

i. X-Frame-Options

```
Header always append X-Frame-Options SAMEORIGIN
```

ii. Content-Security-Policy

```
Header set Content-Security-Policy "default-src 'none'; img-src 'self';
script-src 'self'
'unsafe-inline' 'unsafe-eval'; style-src 'self' https://fonts.googleapis.com
'unsafe-inline';
object-src 'none'; frame-src 'none'; font-src 'self' https://
fonts.gstatic.com; connect-src 'self'
http://<OAM Server>:<OAM Port>/; child-src 'self'"
```

Please note that the policy mentioned here is for the base product. If the product gets customized and content from different URLs needs to be allowed to be executed by the browser, then this policy will have to be modified accordingly.

iii. X-XSS-Protection

```
Header set X-XSS-Protection "1; mode=block"
```

iv. Strict-Transport-Security

Set this for your top level domain. The header directive needs to be included inside the VirtualHost directive

```
<VirtualHost *:443>
Header always set Strict-Transport-Security
"max-age=31540000; includeSubDomains" </VirtualHost>
```

Consider submitting your website to be included in the HSTS preload list of websites maintained by Google Chrome at https://hstspreload.appspot.com/. Other browsers like MS IE 11, MS Edge, Firefox and Opera also refer to this list maintained by Google and therefore the security offered by this mechanism will extend to other browsers too.

v. Cache-Control

```
Header set Cache-Control "max-age=0, no-cache, no-store, must-revalidate
"Header set Pragma "no-cache"
Header set Expires 0
```

2.6 Password Policy Guidelines

Our recommendations for setting a password policy are in line with the latest recommendations from NIST as of June 2018.

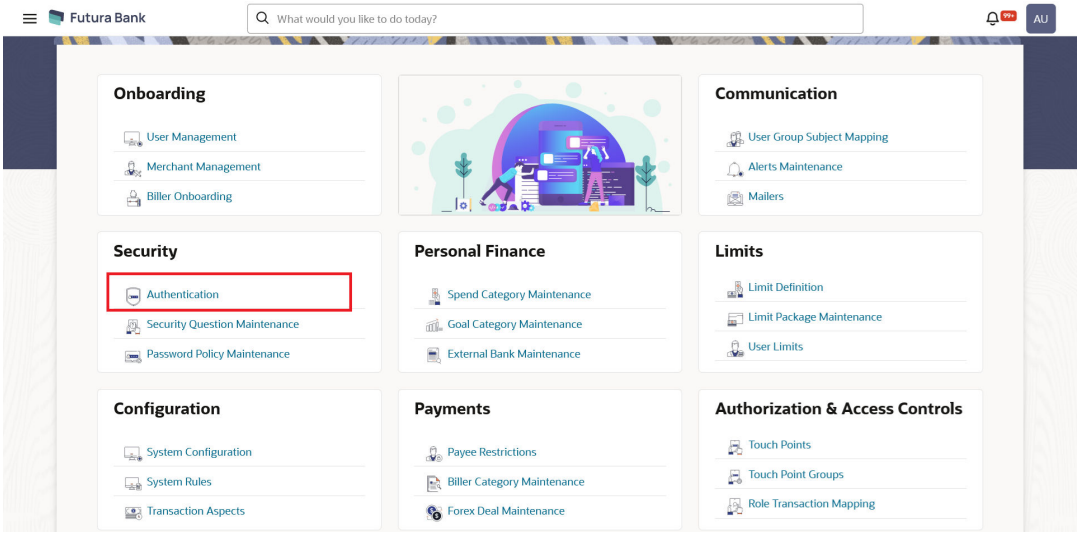
1. The minimum length of a password must be at least 8 characters. You can choose to increase this number to 10 or 12.
2. The maximum length of a password must be at least 64 characters. You can choose to increase this number to 80 or 100.
3. Do not cause passwords to expire without reason. A password must be expired only when the user has forgotten it and has requested a reset.
4. Allow all printable ASCII characters, including spaces, and accept all UNICODE characters too.
5. Do not force the user to use a combination of upper case characters, lower case characters, numbers and special characters.
   Instead recommend to him that he uses “passphrases” instead of passwords, and that’s the reason why the recommended minimum length must be at least 8 and the maximum length must be at least 64.

   Passphrases are sentences like “*Wow, I like the freedom to choose this password!!*” (yes, with spaces, a comma and exclamation marks in it)

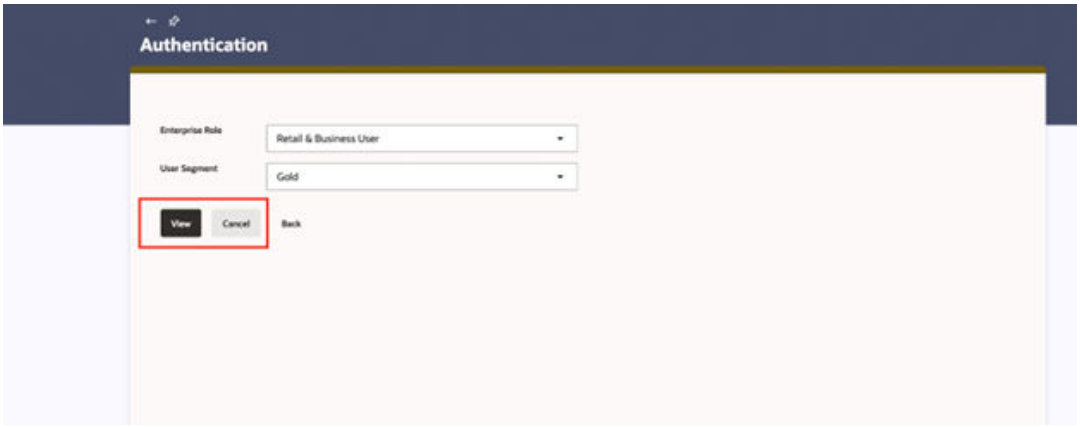
2.7 Configuring 2FA for login

Oracle Banking Digital Experience supports a 2nd factor of authentication during login.

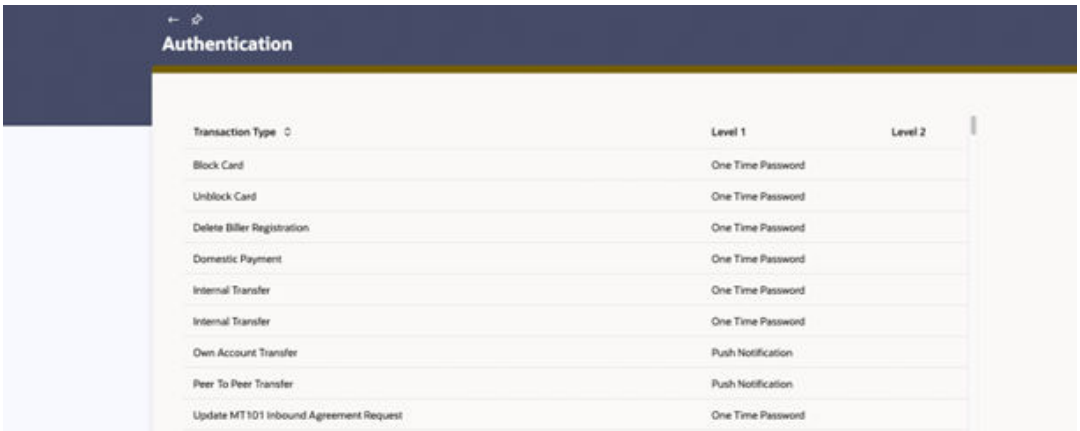
1. Login as the **Admin** user.
2. Click on "**Authentication**".



3. Choose the Enterprise role and user segment for which you want to configure 2FA for login and click on **View**.

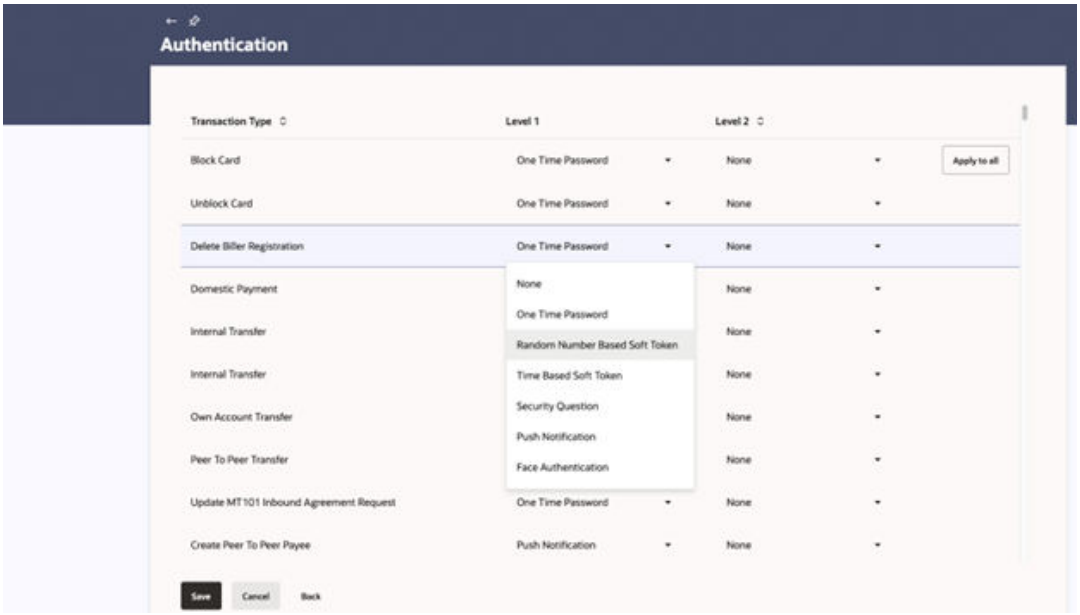


4. You will see the following screen where you can configure 2FA for virtually every transaction, including Login.



5. Click on the **Edit** button at the bottom of the screen.

6. You can now configure up to 2 factors (levels) of authentication / re-authorization. However please note that the system will not let you set “Security Questions” as a factor of authentication / re-authorization for the Login transaction. You will have to choose either OTP or Soft Token.



7. Click on the **Save** button at the bottom of the screen, followed by the **Confirm** button seen in the subsequent verification screen.

2.8 Configuring 2FA Attributes

This section covers some key attributes of the 2nd factor of authentication (re-authorization). Attributes like the maximum number of times a user is allowed to hit the “Resend” button after an OTP is generated, the pool of security questions etc are a couple of examples of 2FA attributes.

These attributes are seen in the database in the `PROP_ID` column of the table `DIGX_FW_CONFIG_ALL_B (CATEGORY_ID = 'authenticationConfig')`. The following table lists

down all possible attributes and their significance. Their values must be set in the column PROP_VALUE.

Table DIGX_FW_CONFIG_ALL_B (CATEGORY_ID = 'authenticationConfig')

PROP_ID	SIGNIFICANCE
OTP.EXPIRATION_TIME	Time in milliseconds after which an OTP will expire.
OTP.MAX_NO_ATTEMPTS	Max number of unsuccessful attempts of entering a valid OTP after which all 2FA enabled transactions for the user will be locked for a "cooling period" amount of time
T_SOFT_TOKEN.EXPIRATION_TIME	Time in milliseconds after which a time based soft token will expire.
R_SOFT_TOKEN.EXPIRATION_TIME	Time in milliseconds after which a random soft token will expire.
SEC_QUE.EXPIRATION_TIME	Time in milliseconds after which answers to the security questions presented to the user will no longer be considered for re-authorization.
EXPIRATION_TIME	Time in milliseconds after which the re-authorization factor will expire. This is the default property that will be looked up in case factor specific expiration times are not maintained.
T_SOFT_TOKEN.MAX_NO_ATTEMPTS	Max number of unsuccessful attempts of entering a valid time based soft token after which all 2FA enabled transactions for the user will be locked for a "cooling period" amount of time.
R_SOFT_TOKEN.MAX_NO_ATTEMPTS	Max number of unsuccessful attempts of entering a valid random soft token after which all 2FA enabled transactions for the user will be locked for a "cooling period" amount of time.
SEC_QUE.MAX_NO_ATTEMPTS	Max number of unsuccessful attempts of entering valid answers to security questions after which all 2FA enabled transactions for the user will be locked for a "cooling period" amount of time.
MAX_NO_ATTEMPTS	Max number of unsuccessful attempts of entering valid 2FA after which all 2FA enabled transactions for the user will be locked for a "cooling period" amount of time. This is the default property that will be looked up in case factor specific Max Attempts are not maintained.
TFA_LOCK_COOLING_PERIOD	This is the cooling period in milliseconds after which 2FA transactions which were locked out because of exceeding MAX_NO_ATTEMPTS, are enabled once again.
OTP.MAX_ACTIVE_REF_NO	Max number of attempts to generate 2FA reference numbers for a transaction after which no more attempts can be made for EXPIRATION_TIME units of time for that factor of authentication. This one is specific to OTPs. This property is in place as a basic mechanism to protect the application against DOS attacks where the end user can keep generating OTPs by initiating transactions and making the system generate the 2nd factor of authentication, but not going through and completing the transaction.
OTP.MAX_ACTIVE_REF_NO	This property is in place as a basic mechanism to protect the application against DOS attacks where the end user can keep generating OTPs by initiating transactions and making the system generate the 2nd factor of authentication, but not going through and completing the transaction.
T_SOFT_TOKEN.MAX_ACTIVE_REF_NO	Max number of attempts to generate 2FA reference numbers for a transaction after which no more attempts can be made for EXPIRATION_TIME units of time for that factor of authentication. This one is specific to Time Based Soft Tokens.

PROP_ID	SIGNIFICANCE
R_SOFT_TOKEN.MAX_ACTIVE_REF_NO	Max number of attempts to generate 2FA reference numbers for a transaction after which no more attempts can be made for EXPIRATION_TIME units of time for that factor of authentication. This one is specific to Random Soft Tokens.
SEC_QUE.MAX_ACTIVE_REF_NO	Max number of attempts to generate 2FA reference numbers for a transaction after which no more attempts can be made for EXPIRATION_TIME units of time for that factor of authentication. This one is specific to Security Questions.
MAX_ACTIVE_REF_NO	Max number of attempts to generate 2FA reference numbers for a transaction after which no more attempts can be made for EXPIRATION_TIME units of time for that factor of authentication. This is the default property that will be looked up in case factor specific Max Active Reference Number attempts are not maintained.
OTP.RESEND_COUNT	Max number of times a user can hit the “Resend” button in case of OTPs. After exceeding this count, the user will need to re-initiate the transaction all over again.
retailuser.NO_QUE_ANS	Number of security questions that a retail user needs to setup (answer). During an actual transaction he will be asked a sub set of these questions.
corporateuser.NO_QUE_ANS	Number of security questions that a corporate user needs to setup (answer). During an actual transaction he will be asked a sub set of these questions.
administrator.NO_QUE_ANS	Number of security questions that an admin user needs to setup (answer). During an actual transaction he will be asked a sub set of these questions.
NO_QUE_ANS	Number of security questions that a user segment needs to setup (answer). During an actual transaction he will be asked a sub set of these questions. This is the default property that will be looked up in case factor specific NO_QUES_ANS is not maintained

2.9 Choosing a non blocking PRNG

OBAPI uses Java’s random number generation capabilities internally. However the out of the box algorithm for PRNG configured in the JDK can block the thread after a certain time if there isn’t enough randomness available. This is because the default configuration uses /dev/random on Linux for PRNG.

Therefore we recommend that you navigate to <JDK_HOME>/jre/lib/security and edit the java.security file. Comment out the old property and change its value as shown below:

```
#securerandom.strongAlgorithms=NativePRNGBlocking:SUN
securerandom.strongAlgorithms=NativePRNGNonBlocking:SUN
```

This will ensure that the application uses /dev/urandom for PRNG.

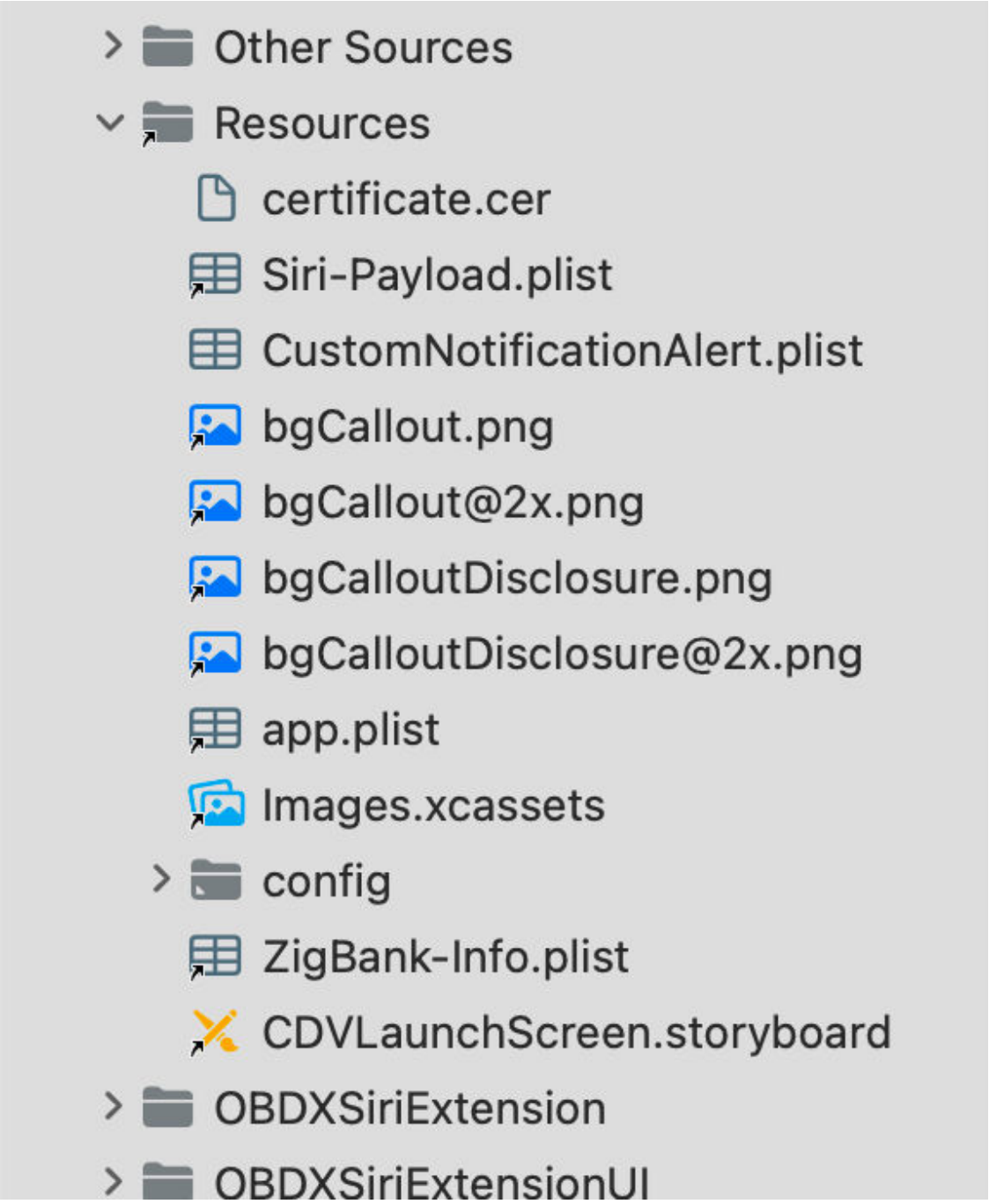
Needless to say, make sure you make this change in the JDK that your WebLogic server is going to be using.

2.10 Mobile App SSL Pinning Configuration

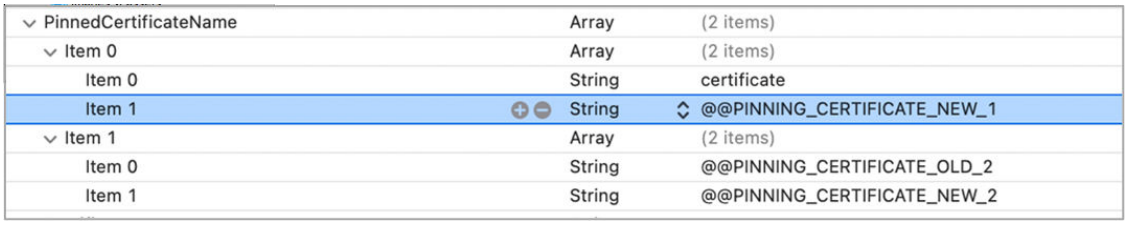
SSL Pinning has been implemented in the mobile apps, both iOS and Android. The public key certificate of the server needs to be imported into these apps for the connection to the server to

be successful. The certificate needs to have an extension .cer and needs to be placed in mobile app workspaces as shown in the images below:

IOS: Certificate needs to be added in workspace



The name of the certificate file needs to be configured in a property file. For iOS it is the `app.plist` file.



For Android, add certificate public keys in theapp.propertiesfile under below property tag.

For Android it is the `app.properties` file.

```
<!-- SSL pinning

Below is the list of Base 64 encoded SHA256 hashed certificates' public keys. Use below command to genera
your certificate. Replace 'certificate.cer' with the path to your certificate.
openssl x509 -inform der -in certificate.cer -pubkey -noout | openssl pkey -pubin -outform der | openssl

-->
<string-array name="certificate_public_keys">
    <item>@@certificate_public_keys</item>
</string-array>
```

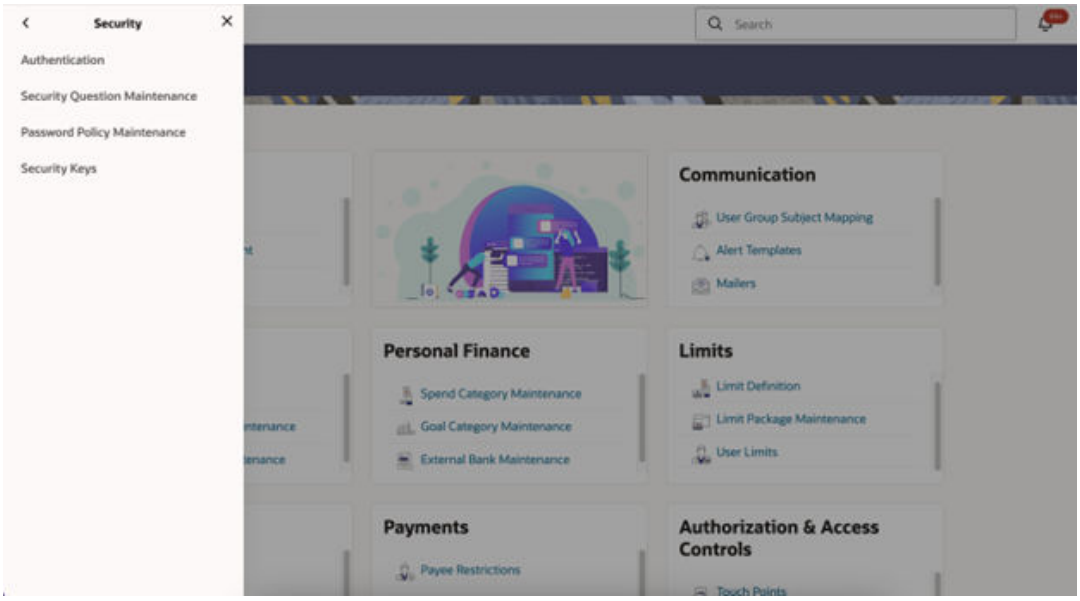
2.11 Generating Security Keys

Oracle Banking Digital Experience supports generating Security Keys required for encryption of sensitive information.

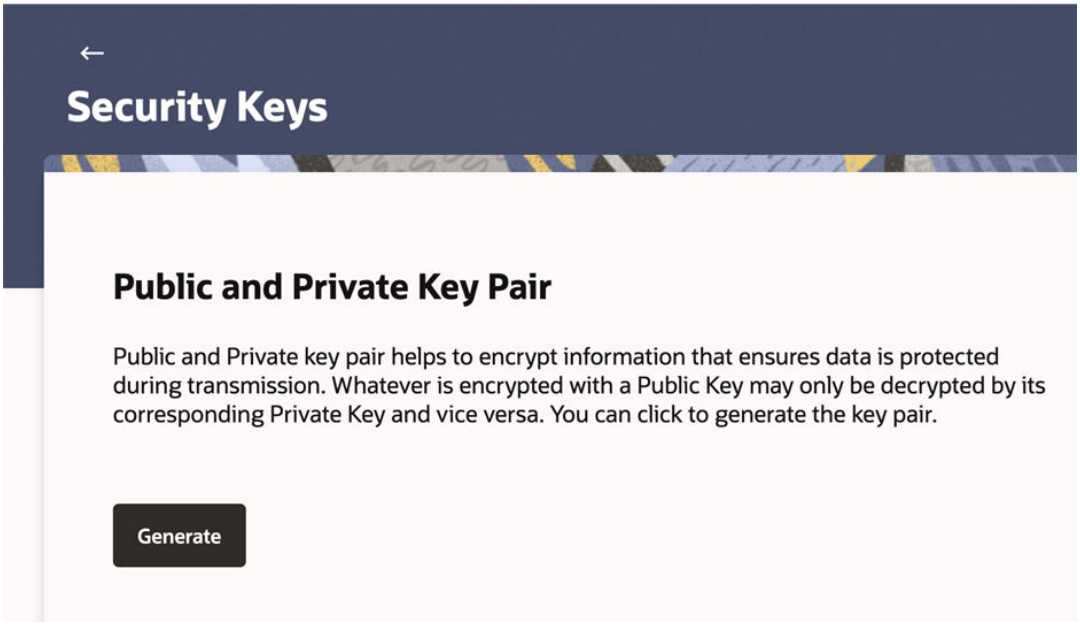
i. Generating Public and Private Key Pair

Oracle Banking Digital Experience supports generating Public and Private Key pair that will be used for encryption of login password on the User Interface.

1. Login as the **Admin** user.
2. Click on menu item “Security” → “Security Keys”



3. Click on “**Generate**” for new Public and Private Key Pair generation used for encryption.



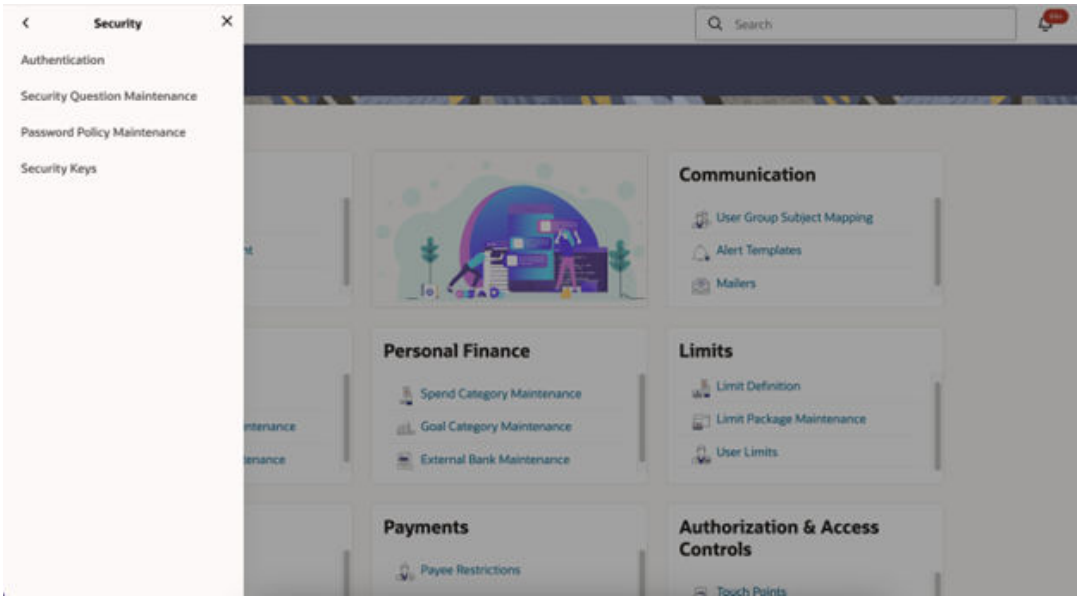
4. Restart the WebLogic server for utilizing the above generated key pair.
   By default the Public and Private key pair is not generated and the password is not encrypted on the User Interface. Once the Key Pair is generated, encryption will be effective after server restart.

   In case of Private key compromise, an Administrator can generate a new Key Pair to mitigate the impact of compromised key.

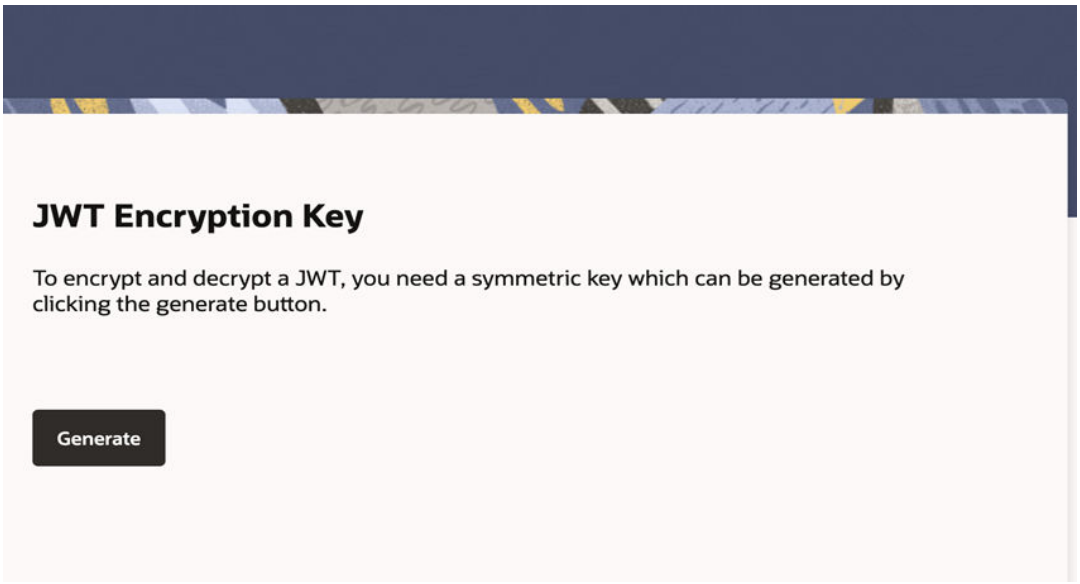
ii. <u>Generating JWT Encryption Key</u>

Oracle Banking Digital Experience supports generating key that will be used for encryption of JSON Web Token (JWT). The JWT is used as a session token for Alternate login (Fingerprint/Pin/Pattern) on mobile apps.

1. Login as the **Admin** user.
2. Click on menu item “Security” → “Security Keys”.



3. Click on “**Generate**” for new encryption key generation used to encrypt JWT.



4. Restart the WebLogic server for the utilizing the above generated encryption key.
   By default the JWT Encrpytion key is not generated and the JWT is stored in clear text.
   Once the Encyrption Key is generated, encryption will be effective after server restart.

   In case of JWT encryption key compromise, an Administrator can generate new encyrption key to mitigate the impact of compromised key.

iii.Generating API Key

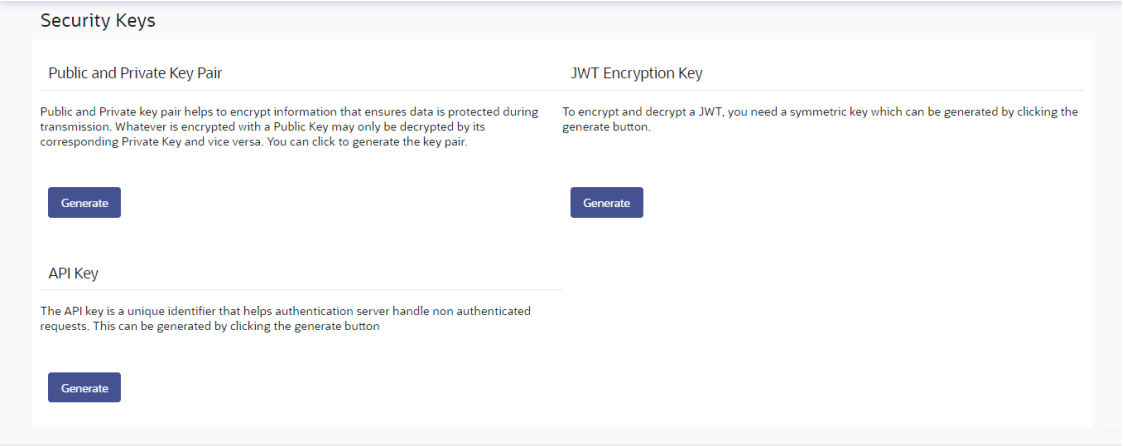
The API key is a unique identifier that helps authentication server handle non authenticated requests. This is required by asynchronous requests such as File upload, alerts, etc. to

communicate with the authentication server. Hence, as a part of Day 1 activity, API Key should be mandatorily generated by clicking the **Generate** button.

Navigation Path:

From **System/ Bank Administrator Dashboard**, click **Toggle Menu**, then click **Menu** and then click **Security**. Under **Security** , click **Security Keys**, then click **API Key**.

Figure 2-1 API Key



> **Note:**
>
> If you change the AES key connector password from Weblogic console, then you need to again generate the API key and take managed server restart.

2.12 API Rate Limiting Recommendations

We recommend API Rate Limiting to be implemented for Business APIs. These APIs can be configured in Web Application Firewall (WAF) for protection from Denial of Service (DoS) attacks.

2.13 Host Header Injection Attack Recommendations

A web server may host several web applications on the same IP address, referring to each application via the virtual host. In an incoming HTTP request, web servers often dispatch the request to the target virtual host based on the value supplied in the Host header. Without proper validation of the header value, the attacker can supply invalid input to cause the web server to:

- dispatch requests to the first virtual host on the list
- cause a redirect to an attacker-controlled domain
- perform web cache poisoning

We recommend the following configuration to be included inside the VirtualHost directive of the **ssl.conf** file in the OHS. The file would be available at location:

```
domains\<Your_domain>\config\fmwconfig\components\OHS\<OHS_instance>

<VirtualHost *:<OHS_PORT>>
            ServerName <OHS_DOMAIN>
            RewriteEngine on
            RewriteOptions inherit
            RewriteCond %{HTTP_HOST}
            !(<OHS_DOMAIN>|<OHS_DOMAIN>:<OHS_PORT>)
            RewriteRule ^(.*)$ -[F,L]
</VirtualHost>
```

This will cause a request to be forbidden if the Host Header is modified to a value other than `OHS_DOMAIN` specified in the configuration.

3
Guidance for Implementation Teams

3.1 Indirect Object Reference Implementation

i. What it means

It is a good security practice to hide sensitive data objects from the end user. Although the system needs to play around with sensitive data objects, it is recommended to refer to these sensitive data objects via pointers – tokens that temporarily point to the sensitive data objects but themselves do not contain any sensitive data.

For example consider a credit card application on the web which offers the following 2 transactions:

- Credit Cards Summary – Displays a list of all credit cards the user owns.
- Credit Card Details – Displays the details of one specific Credit Card that the user selects

The Credit Cards Summary page will typically list all credit card numbers in a masked format. Let's assume that the end user holds 2 Credit Cards C1 and C2. When the end user hits the Summary link, the server returns back the following in its response:

1. Masked Credit Card Number C1 (visible to the user)
2. Masked Credit Card Number C2 (visible to the user)
3. Token T1 (not visible to the user)
4. Token T2 (not visible to the user)

T1 and T2 are random tokens – difficult to guess – which the server has generated as proxies for C1 and C2 respectively. The server has internally stored this mapping of C1-T1 and C2-T2 somewhere. Please note that T1 and T2 are tied to the current session. The moment the session expires, T1 and T2 get discarded. Next time the user logs in, the server generates different tokens T1x and T2x for C1 and C2 respectively.

Whenever the user clicks on say Credit Card Details for C1, the client sends T1 to the server instead of C1, as a request parameter. The server internally figures out that the request is actually for C1 and processes the request accordingly.

Thus we refer to sensitive data indirectly via tokens that are generated with different values for every session.

ii. How OBAPI supports it

To implement the above mechanism the framework offers interception of both the request and the response. The recommendation is to apply indirect referencing to sensitive data fields like Personally Identifiable Information fields aka PII data.

For the interception to work automatically, the sensitive fields holding the PII data must be defined as a Java type, which extends the abstract class

`com.ofss.digx.datatype.complex.MaskedIndirectedObject`.

The abstract class exposes 2 data fields, namely value and displayValue. The `value` field holds the indirect reference value, which is used during data transmission from the client to the server. The `displayValue` field holds the masked value of the data.

The following data types are supported out-of-box:

1. `com.ofss.digx.datatype.complex.Account` - Account number
2. `com.ofss.digx.datatype.complex.Applicant` – The unique identifier to identify an applicant. Typically a party ID.
3. `com.ofss.digx.datatype.complex.ApplicationId` – The unique identifier of an application for account opening.
4. `com.ofss.digx.datatype.complex.ContentId` – The unique identifier for content such as documents for a party.
5. `com.ofss.digx.datatype.complex.CreditCard` – Credit Card Number
6. `com.ofss.digx.datatype.complex.DebitCard` – Debit Card Number
7. `com.ofss.digx.datatype.complex.Email` – Email ID
8. `com.ofss.digx.datatype.complex.Party` – The unique identifier for a party.
9. `com.ofss.digx.datatype.complex.PhoneNumber` – Phone Number
10. `com.ofss.digx.datatype.complex.SSN` – Social Security Number
11. `com.ofss.digx.datatype.complex.SubmissionId` – The unique identifier for a submission containing 1 or more applications for account opening.

To modify the existing/base product-masking pattern for any of the above data types, the following entries need to be copied/cloned from the table `DIGX_FW_CONFIG_ALL_B` to the table `DIGX_FW_CONFIG_ALL_O` and then modified as required in `DIGX_FW_CONFIG_ALL_O`.

> **Note:**
>
> Please DO NOT MODIFY these entries in `DIGX_FW_CONFIG_ALL_B`.

Data Type	Category ID / Preference Name	Property ID
Account	MaskingPattern	AccountNumberMasking
Applicant	MaskingPattern	ApplicantIdMasking
ApplicationId	MaskingPattern	ApplicationIdIdMasking
ContentId	MaskingPattern	ContentIdMaskingPattern
CreditCard	MaskingPattern	CreditCardNumberMasking
DebitCard	MaskingPattern	DebitCardNumberMasking
Email	MaskingPattern	EmailIdMasking
Party	MaskingPattern	PartyIdMasking
PhoneNumber	MaskingPattern	PhoneNumberMasking
SSN	MaskingPattern	SSNMasking

Data Type	Category ID / Preference Name	Property ID
SubmissionId	MaskingPattern	SubmissionIdMaskingPattern

The characters allowed in the making pattern are as below:

N – Keeps the character transparent. Does not mask.

Any other character – Replaces the character at the location with the character specified.

For example: XXXXXNNNN will keep the last 4 characters in clear text and mask the first 5 characters using the character ‘X’.

3.2 Output Encoding

In OBAPI Output Encoding is handled implicitly in the framework for all services, base as well as any custom services that you might write.

There is nothing that you need to do explicitly to achieve this.

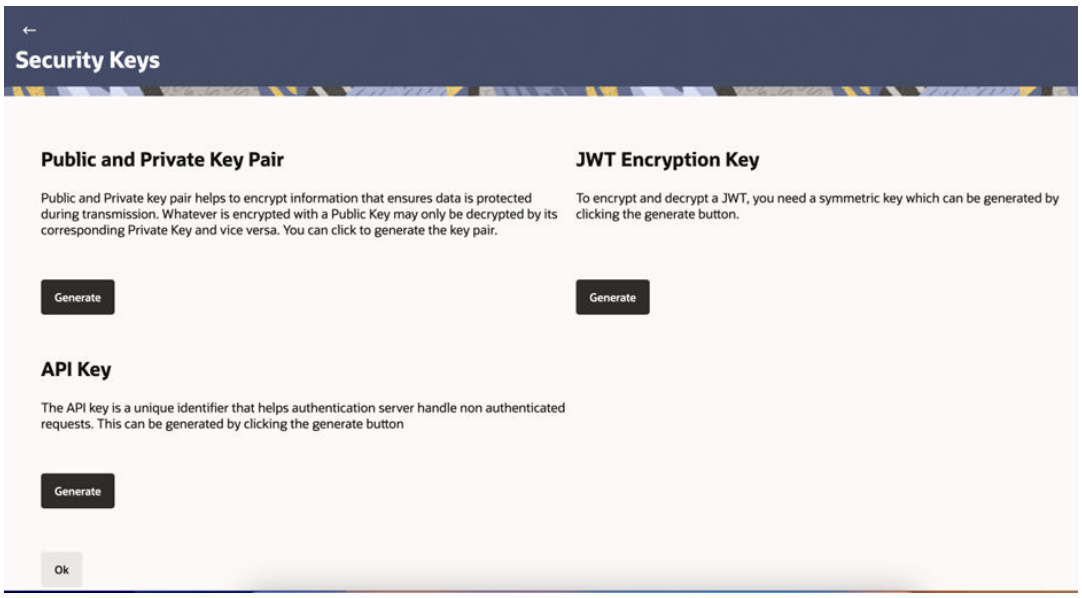
3.3 Implementing a custom Cryptography Provider

The base product provides a symmetric key cryptography framework that enables the implementation team to implement its own custom symmetric key encryption/decryption mechanism.

The product is shipped out with an out of the box Cryptography Provider that will be invoked if no custom implementation is found.

If you wish to write your own custom Cryptography Provider, the required steps are as follows:

1. Write the custom cryptography provider class such that it implements the interface `com.ofss.digx.infra.crypto.spi.ICryptographyProvider` .
   The interface defines methods as shown below:



2. Implement the `encrypt()` and `decrypt()` methods to encrypt and decrypt the data passed to the methods, using the key passed along with the data.
3. Implement the `getVersion()` method to simply return a number greater than 1.
   For example:

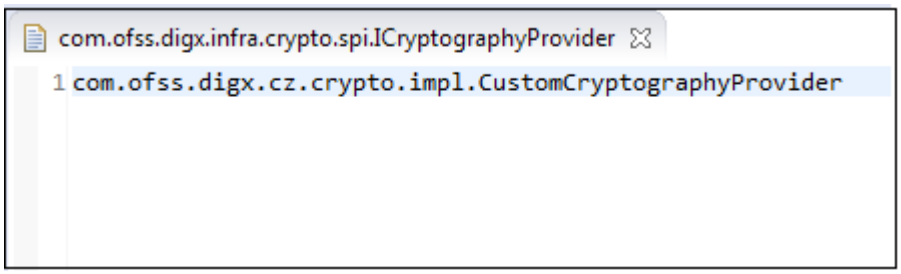
```
public int getVersion() {
    return 2;
}
```

4. Implement the method to simply return the symmetric encryption algorithm name.
   For example:

```
public String getAlgorithm() {
    return "AES";
}
```

5. You can leave the implementations of the other two methods blank.
6. In the custom jar file that contains the custom Cryptography Provider, create a file with the name `com.ofss.digx.infra.crypto.spi.ICryptographyProvider` under the folder structure META-INF/services.

7. Open the file for editing.
8. Type out the fully qualified class name of your custom Cryptography Provider class.
   For example:



Deploy your custom jar on the WebLogic server and you should be all set.

The Cryptography Provider will be invoked when the system invokes the encryption framework for the following actions:

a. Encrypting the SMTP Server password entered by the OBAPI Admin, before storing it in the Database.
b. Encrypting the system generated password for first time users, before storing it in the Database. This is will be relevant to the function of Password Printing.

c. Encrypting the Identification Number for the selected Identification Type (Driver's License, Passport etc.) during originating a loan application online.

3.4 Implementing a custom 2FA mechanism

1. You will need to write your own Java class to implement your own custom factor of authentication.
2. The class must be registered in the table `DIGX_AU_AUTH_TYPE_MST`. Choose a custom ID.

```
select * from DIGX_FW_CONFIG_VAR_B where prop_id like '%SUPPORTED_AUTH_TYPE%'
```

	PROP_ID	ENV_ID	PROP_VALUE
1	SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
2	administrator.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
3	corporateuser.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
4	retailuser.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
5	PC_CM_ME.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN

3. The custom class must implement the interface. `com.ofss.digx.framework.security.authentication.provider.I2FactorAuthenticationProvider`
4. To configure your custom authenticator as an additional option available to the admin during the 2FA configuration of transactions, set the custom ID used in Step 2 in the table `DIGX_FW_CONFIG_VAR_B`.

```
select * from DIGX_FW_CONFIG_VAR_B where prop_id like '%SUPPORTED_AUTH_TYPE%'
```

	PROP_ID	ENV_ID	PROP_VALUE
1	SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
2	administrator.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
3	corporateuser.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
4	retailuser.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN~SEC_QUE
5	PC_CM_ME.SUPPORTED_AUTH_TYPE	OBDX	OTP~SOFT_TOKEN

5. The configuration already seen in the above image suggests that an admin will have the option of setting one of OTP, Soft Token and Security Questions as an additional factor of authentication when configuring 2FA for user segments Retail, Corporate and Administrator.
6. The `PROP_ID` that the system must look up in this table `(DIGX_FW_CONFIG_VAR_B)` is maintained in the table `DIGX_FW_CONFIG_ALL_B` against the `PROP_ID SUPPORTED_AUTH_TYPE`.
7. If `${_PROPERTY_}` is the value maintained against retailuser. `SUPPORTED_AUTH_TYPE` in the table `DIGX_FW_CONFIG_ALL_B`, then for retail users the application will look up the table `DIGX_FW_CONFIG_VAR_B where PROP_ID = _PROPERTY_` to check what options are available to the admin.

```
select * from DIGX_FW_CONFIG_ALL_B where CATEGORY_ID='authenticationConfig'
AND PROP_ID LIKE '%SUPPORTED_AUTH_TYPE%';
```

	PROP_ID	CATEGORY_ID	PROP_VALUE
1	PC_CM_ME.SUPPORTED_AUTH_TYPE	authenticationConfig	${PC_CM_ME.SUPPORTED_AUTH_TYPE}
2	SUPPORTED_AUTH_TYPE	authenticationConfig	${SUPPORTED_AUTH_TYPE}
3	administrator.SUPPORTED_AUTH_TYPE	authenticationConfig	${administrator.SUPPORTED_AUTH_TYPE}
4	corporateuser.SUPPORTED_AUTH_TYPE	authenticationConfig	${corporateuser.SUPPORTED_AUTH_TYPE}
5	retailuser.SUPPORTED_AUTH_TYPE	authenticationConfig	${retailuser.SUPPORTED_AUTH_TYPE}

3.5 Configuring Password Printing Securely

Banks need to provide new customers with system-generated credentials to enable them to login into the system for the first time. Some of the banks prefer to print the first time password on paper and then hand it over to the customer in person.

To enable banks to do this, OBAPI has the “Print Password” function built out of the box. However, the base OBAPI product will not provide an end-to-end solution since password printing is not something universal.

For the sake of this explanation, we are going to break up the process of Password Printing into 6 steps:

- Generate the password using a secure random number generation mechanism.
- Encrypt the password.
- Store the password in the Database.
- Retrieve the password for printing.
- Decrypt the password.
- Do the actual printing.

Steps 2 and 5 can be customized, but not mandatory. Please refer to section **Implementing a custom Cryptography Provider**.

However, it is mandatory to implement Step 6. Here is how you can plug-in your implementation of printing the password:

- Write a custom class that will implement the interface com.ofss.digx.app.sms.user.printinformation.provider.IUserInformationPrintAdapter
- The interface defines a single method as shown below:

```
package com.ofss.digx.app.sms.user.printinformation.provider;

import com.ofss.digx.app.sms.dto.user.printInformation.PasswordPrintInformationDTO;

public interface IUserInformationPrintAdapter {

    /**..

    public void print(PasswordPrintInformationDTO userprintDTO) throws Exception;

}
```

- The DTO passed to the `print()` method will contain the password that is needed for printing.
- Also, add the following entry to the file Preferences.xml
  <Preference name="UserPrintConfig'"
  PreferencesProvider="com.ofss.digx.infra.config.impl.DBBasedPropertyProvider"
  parent="jdbcpreference" propertyFileName="select prop_id, prop_value from digx_fw_config_all_b where category_id = 'UserPrintConfig'"
  syncTimeInterval="36000000" />
- Run the following Database script

```
Insert into DIGX_FW_CONFIG_ALL_B
        (PROP_ID, CATEGORY_ID, PROP_VALUE, FACTORY_SHIPPED_FLAG,
PROP_COMMENTS, SUMMARY_TEXT,
        CREATED_BY, CREATION_DATE, LAST_UPDATED_BY, LAST_UPDATED_DATE,
OBJECT_STATUS,
        OBJECT_VERSION_NUMBER) values
('USER_INFORMATION_PRINT_PROVIDER','UserPrintConfig',

'com.ofss.digx.app.sms.user.printinformation.provider.CustomUserInformation
PrintAdapter','N',null,'Custom
        adapter for User Password Information
Printing','ofssuser',sysdate,'ofssuser',sysdate,'A',1);
```

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