Oracle® Banking Corporate Lending

Development Security Guide

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Oracle Banking Corporate Lending Development Security Guide, Release 14.8.0.0.0

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Contents

Preface

This topic contains the following sub-topics:

Purpose

This document provides security-related usage and configuration recommendations for Oracle Banking Corporate Lending. This guide may outline procedures required to implement or secure certain features, but it is also not a general-purpose configuration manual.

Audience

This guide is primarily intended for IT department or administrators deploying Oracle Banking Corporate Lending application and third party or vendor software's. Some information may be relevant to IT decision makers and users of the application are also included. Readers are assumed to possess basic operating system, network, and system administration skills with awareness of vendor/third-party software's and knowledge of Oracle Banking Corporate Lending application.

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.

Access to Oracle Support

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 make sure 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.

Related Resources

For more information on any related features, refer to *Security Management System User Guide*.

Conventions

The following text conventions are used in this document:

Table Conventions and Meaning

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.

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 Acronyms and Abbreviations

Abbreviation	Description
AES	Advanced Encryption Standard
ASCII	American Standard Code for Information Interchange
CSRF	Cross-Site Request Forgery
ECC	Error correction code
EJB	Enterprise Java Beans
FCUBS	Oracle FLEXCUBE Universal banking Solutions

Table (Cont.) Acronyms and Abbreviations

Abbreviation	Description
HTTP	Hypertext Transfer Protocol
LDAP	Lightweight Directory Access Protocol
OAM	Oracle Access Manager
OBCL	Oracle Banking Corporate Lending
OIM	Oracle Identity Management
PCI	Peripheral Component Interconnect
SSO	Single sign-on
SAML	Security Assertion Markup Language
SQL	Structured Query Language
SSL	Secure Sockets Layer
TDES	Triple Data Encryption Standard
TLS	Transport Layer Security
URL	Uniform Resource Locator
XSD	XML Schema Documents
XSS	Cross-Site Scripting

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How to address the OWASP Top10 in Oracle Banking Corporate Lending

This topic contains following sub-topics:

1.1 Injection

Injection flaws occur when an application sends untrusted data to an interpreter. Injection flaws are very prevalent, particularly in legacy code. They are often found in SQL, LDAP, Xpath, or SQL queries; OS commands; XML parsers, SMTP Headers, program arguments, and so on. Injection flaws are easy to discover when examining code.

Application uses Oracle database and it has adequate in-built techniques to prevent SQL injections as underlined below:

1. **Use of prepared statements (parameterized queries)** - Application uses Prepared Statement with bind variables to construct and execute SQL statements in JAVA.
2. **Use of Stored procedures** - Stored procedures have the same effect as the use of prepared statements when implemented safely. **Implemented safely** means the stored procedure does not include any unsafe dynamic SQL generation. Application uses safe Java stored procedures calls.
   In addition to the above, wherever dynamic queries exist, application uses adequate defence to sanitize the un-trusted input. The use of DBMS_ASSERT.SIMPLE_SQL_NAME and the use of bind variables justify the fact.
3. **Escaping all user supplied input** - This third technique is to escape user input before putting it in a query. If it is a concern that rewriting the dynamic queries as prepared statements or stored procedures might break the application or adversely affect performance, then this might be the best approach for the purpose. However, this methodology is frail compared to using parameterized queries and there is no guarantee that it prevents all SQL Injection in all situations.
   APPLICATION uses context specific escaping. It has a String Escape Utils.java file, where context specific escaping is handled.

1.2 Broken Authentication and Session Management

In application session interval is validated against the session interval stored in the configurable file FCUBS.properties file. Validations are added to check the maximum time limit for the inactive session from being expired. Java API method javax.servlet.http.HTTP Session sets the max time out period for the session.

A maximum limit is imposed on the value passed to set the maximum limit of session interval. The maximum limit is a positive practical value. This validation is required to prevent long running sessions that can be actively targeted.

The default value for session time out is 30 minutes and it is configurable in properties file.

The session used for login authentication is not validated (destroyed) and a new session is created once the user logged-in successfully to the application. And the new session is used to store the required variables.

A session attribute IsAuthenticated set to **Y** on successful login to the application. A new random token (Cross-site request forgery) also generates and same is available in the session attribute.

The entire subsequent request within the session have the Authenticated and Cross-site request forgery tokens .Every request send to the application from the browser is validated against the IsAuthenticated attribute and Cross-site request forgery token.

A hidden form is used to submit the logout request to the server, with the response resulting in a 302 redirect instead of client initiated redirect to the login page.

Session get expire once user log off from application or if idle for its maximum limit.

Cryptography used

PCI council defines **Strong Cryptography** as:
Cryptography based on industry-tested and accepted algorithms, along with strong key lengths and proper key-management practices. Cryptography is a method to protect data and includes both encryption (which is reversible) and hashing (which is not reversible, or **one way**). SHA-1 is an example of an industry-tested and accepted hashing algorithm. Examples of industry-tested and accepted standards and algorithms for encryption include AES (128 bits and higher), TDES (minimum double-length keys), RSA (1024 bits and higher), ECC (160 bits and higher), and ElGamal (1024 bits and higher).

Encryption algorithm

The application leverages AES encryption algorithm to store sensitive information into properties file. This algorithm uses 256 bit secret key for encryption and decryption which is stored at property file.

Hashing algorithm

Oracle Banking Corporate Lending Solutions leverages SHA-512 hashing algorithm for user password authentication. This algorithm generates a password digest for the user password by using the SALT (Random number generated using SHA1PRNG algorithm) and the iteration number available in the property file.

Session storage

Oracle Banking Corporate Lending Solutions application does not store Http Session objects.

A unique sequence number generates and stored in current user table for the purpose of mapping server-side sessions with the entries in the current user table.

During session expiry (triggered by the container), the session listener provides the application with the sequence number of the session. The application makes checks as to whether the entry in current user table contains the same sequence number. Only in such a case should the entry be deleted.
When authentication of credentials (involving an incorrect user ID) is unsuccessful, the user id should not be logged in the audit logs (database table). The following possible scenarios are accounted for:

Session logging

Unsuccessful attempt to login is stored in the database with terminal's IP address and timestamp. Invalid and expired session IDs submitted to the application are categorized as authentication failures and the same are logged in the database table.

1.3 Cross-Site Scripting (XSS)

XSS is the most prevalent web application security flaw. XSS flaws occur when an application includes user supplied data in a page sent to the browser without properly validating or escaping that content. Application is coded keeping in view the XSS prevention rules as below:-

1. **Technique#1 - HTML Escape before inserting untrusted data into HTML element content**
   Across the Oracle Banking Corporate Lending application, context specific escaping has been used to sanitize the untrusted data. For HTML content, the below function takes care of escaping the probable tainted data:

   - Public static String escapeHTML (String input):
     Escaping the following characters, with HTML entity encoding, to prevent switching into any execution context, such as script, style, or event handlers has been done. Use of recommended hex entities is in place. In addition to the 5 characters significant in XML (&, <, >, ", '), the forward slash is included as it helps to end an HTML entity.

     & --> &

     < --> <

     > --> >

     " --> "

     ' --> '

     / --> /

2. **Technique #2 - JavaScript Escape Before Inserting Untrusted Data into JavaScript Data Values**
   Including untrusted data inside any other JavaScript context is quite dangerous, as it is extremely easy to switch into an execution context with characters including (but not limited to) semi-colon, equals, space, plus, and many more. For JavaScript context, the below function takes care of escaping the probable tainted data:

   - Public static String escapeJavaScript(String input);

3. **Technique #3 - Escape JavaScript Characters**
   This works in conjunction with rule#2. Except for alphanumeric characters, all characters less than 256 are escaped with the \xHH format to prevent switching out of the data value into the script context or into another attribute. No use of any escaping shortcuts like \",

because the quote character may be matched by the HTML attribute parser which runs first. These escaping shortcuts are also susceptible to **escape-the-escape** attacks where the attacker sends \" and the vulnerable code turns that into \\" which enables the quote.

4. **Technique #4 - URL Escape And Strictly Validate Before Inserting Untrusted Data into HTML URL Parameters.**
   Oracle Banking Corporate Lending encodes URL with the URLEncoder java class. It does not check for a valid URL, but directly does URL encoding, and that encoding is based on the context of display.
5. **Technique #5 - Use of HttpOnly and secure cookie flag**
   Oracle Banking Corporate Lending uses the HTTPOnly flag on the session cookie and any custom cookies that are not accessed by any JavaScript.

1.4 Insecure Direct Object References

1. **Use of prepared statements (parameterized queries)**
   Oracle Banking Corporate Lending uses Prepared Statement with bind variables to construct and execute SQL statements in JAVA.
2. **Input Validation**
   Oracle Banking Corporate Lending is a web based application, the request data from browser to server is passed using request headers and request parameters. All the request fields coming from the client are validated using white list validation to prevent cross site scripting.

   User defined method validateParameter() is used for input validation which checks each character of the request field with a range of allowed characters.

   User defined methods escapeJavaScript(), escapeHTML() and escapeURL() sanitizes the output data before flushing it into client browser.

   escapeJavaScript() escapes all characters except immune JavaScript characters and alphanumeric characters in the ASCII character set. All other characters are encoded using the \\xHH or \\uHHHH notation for representing ASCII or Unicode sequences.

   escapeHTML() escapes the characters with equivalent HTML entities obtained from the lookup map. Lookup map has entities such as amp, quot, lt, gt, and so on.

   escapeURL() encodes the URL using URLEncoder class.

   White list validation is also used to restrict Image/signature/excel upload and to check rights for every operation performed by user.
3. **Image Content validation**
   Signature upload checks for image type and image content using the inbuilt classes (ImageIO and JarFile) available in java.
4. **Field validation**
   Field level validations exist for all mandatory fields. Database too had limits on the type and the length of data. Blacklisted characters are not allowed in the mandatory fields. Nevertheless, Oracle Banking Corporate Lending has free-text fields, which takes all data, entered by the user, as a String.
5. **Restriction on Blacklist characters**
   Similar to white list validation black list validation is also used for validating the request fields. Oracle Banking Corporate Lending uses blacklist validation to check whether the request xml contains unwanted tags like scripting tag, html tag, anchor tag, and so on, inside the xml content. It is also used for the advance summary field's validation to check whether proper request fields are coming from the browser.

Below table shows the list of bad characters which are not allowed in URL path but the Oracle Banking Corporate Lending operations requires many of the below characters to be passed in the request. So Oracle Banking Corporate Lending encodes the below bad characters before sending them through the URL and same is decoded at the server to prevent the hacker from modifying the request.

Table 1-1 Unsafe Characters

Bad URL Characters	(Unsafe Characters)
&	//
<	./
>	/.
;	/*
\"	*.
\'	~
%	\
)	25%
(	%25u
+	%25U
,	%00-%1f, %7f-%ff
" " (Space)	%00-%1f and %7f-%ff
-	%25u and %25U

6. **Restriction on Script/Html tags**
Oracle Banking Corporate Lending has blacklist validation for unwanted tag in xml like scripting tag or html tag inside xml content particularly in the header.

1.5 Security Misconfiguration

1. **Configuration files**
Configuration files are securely placed inside the Classes folder of the WEB-INF folder which is not publicly accessible.

2. **Exception handling in java**
Different types of exceptions can rise in application. Java exceptions handled using try catch blocks available in java. Sometimes we use the Throw statement to throw an exception which is caught by the catch block. Caught exceptions are written into the log files for the debug purpose when ever required. Whenever any exception occurs in application, proper information used to send to the front-end user by showing alert.

3. **Exception handling in oracle database**
Database exceptions handled using EXCEPTION statement available in PL/SQL. Caught exceptions are written into the log files for the debug purpose. And proper error message created to send the same in response to the user.

4. **Package lockout situation handled in backend**
Application is hanged in an oracle system package lockout situation. Locked objects are released manually using SQL scripts or through database restart. We have handled cursor lock out problem in the required packages.

5. **Auto generated password**
The password is generated by the system accordance to the password policy. The salt is also be generated every time the password is changed by using predefined algorithm.

   The salt concatenated with auto generated password and SHA-512 hash applies on the resultant which results the password digest.

Once the successful generation of password digests both salt and password digest is stored in the DB.

6. **Custom password**
   The password is keyed in by the administrator / user accordance to the password policy. The salt is generated every time the password is changed by using predefined algorithm.

   The salt concatenated with the password input and SHA-512 hash applies on the resultant which results the password digest.

   Once the successful generation of password digests both salt and password digest is stored in the DB.

   Oracle Banking Corporate Lending does not provide any default user/password. User and password needs to be created at the time of installation.

7. **Sand Box for File Upload**
   The application uses a sandbox for placing files that are uploaded through the signature/ image upload screen. The sandbox is placed in a specified location (the location is specified in the properties file) on the server.

8. **BI Publisher Reports – generation and access**
   The application uses a sandbox for placing the generated reports file into a sandbox area. The sandbox is placed in a specified location (the location is specified in the properties file) on the server. The application validates if the user has explicit Rights to generate Reports.

1.6 Sensitive Data Exposure

1. **Secure Transformation of Data (SSL)**
   The Installer allows a deployer to configure the application such that all HTTP connections to the application are over SSL/TLS. In other words, all HTTP traffic in the clear is prohibited; only HTTPS traffic is allowed. It is mandatory to enable this option in a production environment, especially when WebLogic Server acts as the SSL terminator.

   A two-way SSL is used when the server needs to authenticate the client. In a two-way SSL connection the client verifies the identity of the server and then passes its identity certificate to the server. The server then validates the identity certificate of the client before completing the SSL handshake.
   In order to establish a two-way SSL connection, need to have two certificates, one for the server and the other for client. This is required for de-centralized setup of application.

   For Oracle Banking Corporate Lending Solutions, need to configure a single connector. This connector is related to SSL/TLS communication between host or browser and the branch which uses two-way authentication.
   If the secure flag is set on a cookie, then browsers shoud not submit the cookie in any requests that use an unencrypted HTTP connection, thereby preventing the cookie from being trivially intercepted by an attacker monitoring network traffic.

   Below configuration has to be ensured in weblogic.xml within the deployed application ear.

   - Cookies are set with Http only as true
   - Cookie secure flag set to true

- Cookie path to refer to deployed application

```
<wls: session-descriptor>
<wls: cookie-http-only>true</wls: cookie-http-only>
</wls: session-descriptor>


<wls: session-descriptor>
<wls: cookie-secure>true</wls: cookie-secure>
<wls: url-rewriting-enabled>false</wls: url-rewriting-enabled>
</wls: session-descriptor>


<session-descriptor>
<cookie-name>JSESSIONID</cookie-name>
<cookie-path>/<DeployedApplicationPath></cookie-path>
<cookie-http-only>true</cookie-http-only>
<cookie-secure>true</cookie-secure>
<url-rewriting-enabled>false</url-rewriting-enabled>
</session-descriptor>
```

Always make sure Cookies are set with always Auth Flag enabled by default for WebLogic server.

2. **Sign-On messages**
Below table shows the general Sign-On messages which is displayed to the user during invalid authentication.

Table 1-2 Sign-On messages

Message	Explanation
User Already Logged In	The user has already logged into the system and is attempting a login through a different terminal.
Invalid User ID/Login.	An incorrect user ID or password was entered.
i**User Status is Disabled. Please contact your System Administrator.**	The user profile has been disabled due to number of dormancy days allowed for the user has exceeded the dormancy days configured in the system.
User Status is Locked. Please contact your System Administrator.	The user profile has been locked due to an excessive number of attempts to login, using an incorrect user ID or password. The number of attempts could have matched either the successive or cumulative number of login failures (configured for the system).

3. **CACHE Control in Servlet and jsp**
There are three basic HTTP response headers that prevent a page from being cached to disk. Different browsers handle them in slightly different ways, so they need to be used in combination to ensure all browsers do not cache the specific page. These headers are **Expires**, **Pragma** and **Cache-control**. In addition, these headers can either be sent directly by the server or placed in the HTML code as HTTP-EQUIV META tags within the HEAD section. The **Expire** header gives a date at which point the page should expire and no longer be cached. Internet Explorer supports a date of **0** for immediately and any negative number for already expired. The **Pragma: no-cache** header indicates that the page should not be cached.

4. **Clickjacking/Frame-bursting**
   Application uses the X-Frame-Options HTTP response header to indicate whether or not a browser should be allowed to render a page in a <frame> or <iframe>. This is used to avoid Clickjacking attacks, by ensuring that the content is not embedded into other sites.

1.7 Missing Function Level Access Control

It is likely that users working in the same department at the same level of hierarchy need to have similar user profiles. In such cases, you can define a Role Profile that includes access rights to the functions that are common to a group of users. A user can be linked to a Role Profile by which you give the user access rights to all the functions in the Role Profile.

Application level access has implemented through the Security Management System (SMS) module. SMS supports **ROLE BASED** access of Screens and different types of operations.

Oracle Banking Corporate Lending Solutions supports dual control methodology, wherein every operation performed has to be authorized by another user with the requisite rights. Please refer *2.6 section of the SMS user manual* for more details.

Apart from the role based access control particular functions , products can be restricted for user as described below.

Table 1-3 Function Level Access Control

Fields	Description
Disallowed functions	Function IDs or UI level restrictions can be provided for the user by including the function Ids in the disallowed list. This restricts the user from accessing the UI. When accessed, an error message dialogue box pops up saying - `User not authorized to access the screen`
Disallowed account class	The user could be restricted to perform any operation using a particular a/c class. When disallowed, no accounts could be created by the user using the account class.
Disallowed products	The user could be restricted to use product(s) of any module(s), if disallowed. This is really required when restricting users department wise. For example, staffs of accounts department need not be given access to view the loans of customers.
Disallowed branches	The user could be restricted to access branches other than his own branch (reporting branch). He can be given access to login from other branches of the bank at an approval from authenticated person, an action which again requires manual authorization.

1.8 Cross-Site Request Forgery (CSRF)

In case of XMLHttpRequest objects, the XMLHttpRequest object sets a custom HTTP header in the request, with the header value being the Cross-site request forgery token; the server then verifies for the presence of such a header and the Cross-site request forgery token. This serves as a protection at endpoints used for XMLHttpRequest requests, since only XMLHttpRequest objects can set HTTP headers (apart from Flash; and both cannot make cross-domain requests).

1.9 Using Components with Known Vulnerabilities

Source code scanning done using the latest fortify to identify the sources code issue and provides the proper fix for the reported issues.

3rd party libraries scanning for every release has been done to validate if any security issues rise for any of the components or not. Update the 3PL with latest security patch or upgraded to latest version.

1.10 Unvalidated Redirects and Forwards Network Security

Application uses 302 redirect wherever required. Oracle Banking Corporate Lending uses response.sendRedirect(newURL);

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Securing Gateway Services

Different applications deployed on disparate platforms and using different infrastructure need to be able to communicate and integrate seamlessly with Oracle Banking Corporate Lending in order to exchange data. The Oracle Banking Corporate Lending Integration Gateway caters to these integration needs.
The integration needs supported by the Gateway can be broadly categorized from the perspective of the Gateway as follows:

- **Inbound application integration** – used when any external system needs to add, modify or query information within Oracle Banking Corporate Lending
- **Outbound application integration** – used when any external system needs to be notified of the various events that occur within Oracle Banking Corporate Lending.

This topic contains following sub-topics:

2.1 Inbound Application Integration

Oracle Banking Corporate Lending Inbound Application Gateway provides XML based interfaces thus enhancing the need to communicate and integrate with the external systems. The data exchanged between Oracle Banking Corporate Lending and the external systems are in the form of XML messages. These XML messages are defined in Oracle Banking Corporate Lending in the form of XML Schema Documents (XSD).

Oracle Banking Corporate Lending Inbound Application Integration Gateway uses the Synchronous and Asynchronous Deployment Pattern for addressing the integration needs.

The Synchronous Deployment Pattern is classified into the following:

- EJB Based Synchronous Inbound Application Integration Deployment Pattern
- Web Services Based Synchronous Inbound Application Integration Deployment Pattern
- MDB Based Asynchronous Inbound Application Integration Deployment Patten

2.2 EJB Based Synchronous Deployment Pattern

The Enterprise Java Beans (EJB) deployment pattern is used in integration scenarios where the external system connecting to Oracle Banking Corporate Lending is **EJB literate**, that is, the external system is capable of interacting with Oracle Banking Corporate Lending based upon the EJB interface. In this deployment pattern, the external system uses the RMI/IIOP protocol to communicate with the Oracle Banking Corporate Lending EJB.

In this deployment pattern the EJB displayed by Oracle Banking Corporate Lending is a stateless session bean. The actual request is in the form of an XML message. After the necessary processing is done in Oracle Banking Corporate Lending based on the request, the response is returned to the external system as an XML message. The transaction control for the processing stays with the Oracle Banking Corporate Lending EJB.

2.3 Web Services Based Synchronous Deployment Pattern

The web services deployment pattern is used in integration scenarios where the external system connecting to Oracle Banking Corporate Lending wants to connect using standards-based, inter-operable web services

This deployment pattern is especially applicable to systems which meet the following broad guidelines:

- Systems that are not **EJB literate**, that is, such systems are not capable of establishing connections with Oracle Banking Corporate Lending based upon the EJB interface; and/or
- Systems that prefer to use a standards-based approach

In this deployment pattern, the external system uses the SOAP (Simple Object Access Protocol) messages to communicate to the Oracle Banking Corporate Lending web services.

The services displayed by Oracle Banking Corporate Lending are of a **message based** style, that is, the actual request is in the form of an XML message, but the request is **payload** within the SOAP message. After the necessary processing is done in Oracle Banking Corporate Lending based on the request, the response is returned to the external system as an XML message which is a **payload** within the response SOAP message. The transaction control for the processing stays with the Oracle Banking Corporate Lending.

2.4 HTTP Servlet Based Synchronous Deployment Pattern

The HTTP servlet deployment pattern is used in integration scenarios where the external system connecting to Oracle Banking Corporate Lending wants to connect to Oracle Banking Corporate Lending using simple HTTP messages.

This is especially applicable to systems such as the following:

- Systems that are not **EJB literate**, that is, are not capable establishing a connections with Oracle Banking Corporate Lending based upon the EJB interface; and/or
- Systems that prefer to use a simple http message based approach without wanting to use SOAP as the standard.
- In this deployment pattern, the external system makes an HTTP request to the Oracle Banking Corporate Lending servlet.
  For this deployment pattern, Oracle Banking Corporate Lending displays a single servlet. The actual request is in the form of an XML message. This XML message is embedded into the body of the HTTP request sent to the Oracle Banking Corporate Lending servlet.

After the necessary processing is done in Oracle Banking Corporate Lending based on the request, the response is returned to the external system as an XML message which is once again embedded within the body of the response HTTP message. The transaction control for the processing stays with the Oracle Banking Corporate Lending.

2.5 MDB Based Asynchronous Deployment Pattern

The MDB deployment pattern is used in integration scenarios where the external system connecting to Oracle Banking Corporate Lending wants to connect to Oracle Banking Corporate Lending using JMS queues.

This is especially applicable to systems such as the following:

- Systems that prefer to use JMS queues based approach without wanting to wait for the reply.
- Here external system sends messages in XML format to request queue on which an MDB is listening. When a message arrives on the queue, it is picked up for processing. After the necessary processing is done in Oracle Banking Corporate Lending , based on the request, the response is sent to the response queue as an XML message.

2.6 Outbound Application Integration

The Outbound Application Integration is also called the Oracle Banking Corporate Lending Notify Application Integration layer. This application layer sends out notification messages to the external system whenever events occur in Oracle Banking Corporate Lending.

The notification messages generated by Oracle Banking Corporate Lending on the occurrence of these events are XML messages. These XML messages are defined in the form of XML Schema Documents (XSD) and are referred to as **FLEXCUBE formats**.

2.7 Securing Web Services

Web services can be secured by applying security policies available in web logic sever. We can attach two types of policies to Web Logic Web services and clients at design and deployment time.

- **Oracle WSM policy** : We can attach Oracle Web Services Manager(WSM) policies to Web Logic JAX-WS Web services and clients.
- **Web Logic Web service policy**: This policies are provided by Oracle Web Logic Server and can be attached to any web service deployed in Web Logic.

We can use Oracle Enterprise Manager Fusion Middleware Control to attach Oracle WSM security policies to Web Logic Java EE Web services and clients.

We can attach policies to Web Logic Web services at both design time and after the Web service has been deployed.

At design time, use the weblogic.jws.Policy and weblogic.jws.Policies JWS annotations in JWS file to associate policy files with Web service. We can associate any number of policy files with a Web service, although it is up to us to ensure that the assertions do not contradict each other. We can specify a policy file at the class level of our JWS file.

After the Web service has been deployed, use the Oracle Web Logic Server Administration Console to attach Web Logic Web service policies to Web Logic Web services.

2.8 Accessing Service and Operation

In a message it is mandatory to maintain a list of Service Names and Operation Codes. This information is called Gateway Operations.

A combination of every such Service Name and Operation Code is mapped to a combination of Function ID and Action. Every screen in Oracle Banking Corporate Lending is linked with a function ID. This information is called Gateway Functions.

User can gain access to an external system using the Gateway Functions. The Function IDs mapped in Gateway Functions should be valid Function IDs maintained in Oracle Banking Corporate Lending. Hence, for every new Service or Operation being introduced, it is important that you provide data in Gateway Operations and Gateway Functions.

2.9 Gateway Password Generation Logic for External System Authentication

As a secure configuration password authentication should be enabled for the external system maintained. The same can be verifying in external system detail screen level.

Once these features enable, system validates for Encrypted password as part of every request sent by the External System.

The Message ID which is present as part of the header in Request XML, is considered as hash. External System generates a unique Message ID, which is functional mandatory field in the header. Create a Message Digest with SHA-512 algorithm.

The hash created from the previous step and the password in clear text together is encrypted in AES encryption method. Apply Base64 encoding to encrypted value and send to the Oracle Banking Corporate Lending gateway.

2.10 XSD Validation and Input Validation

Oracle Banking Corporate Lending supports the XSD validation for all types Gateway. Each node in request xml is getting validated with the corresponding webservice XSD's.

Restriction on Script/Html tags.

Oracle Banking Corporate Lending Gateway has blacklist validation for unwanted tag in xml like scripting tag or html tag inside xml content particularly in the header.

2.11 List of Services

Table 2-1 List of Services

Service Name	Description	Operation
FCUBSOLService	This single service covering all the major operations through Webservices for OL Module.	• AuthorizeAccRoleHeadMnt • AuthorizeAccntPeriod • AuthorizeAuthContAmend • AuthorizeBranchTreasury • AuthorizeContAmend • AuthorizeContract • AuthorizeContractAuth • AuthorizeContractInactive • AuthorizeContractVerRoll • AuthorizeCustAddMaint • AuthorizeCustCategoryMnt • AuthorizeCustEntity • AuthorizeCustMaint • AuthorizeDisbursement • AuthorizeDsbrAuth • AuthorizeExPmtResponse • AuthorizeExResponse • AuthorizeExchRateAmnd • AuthorizeExpenseGrpMnt • AuthorizeFCHOL • AuthorizeHostParameter • AuthorizeIndustryMaint • AuthorizeInterestClassMaint • AuthorizeInterestLimits • AuthorizeLoanParameters • AuthorizeMsgFormatMaint • AuthorizeMsgRightsMnt • AuthorizeMsgTypMaint • AuthorizeMultiLoanPayment • AuthorizeOLDMSCDT • AuthorizeObligorRiskRate • AuthorizePartyTypeDef • AuthorizePayMtAuth • AuthorizePayment • AuthorizeProduct • AuthorizeProductFields • AuthorizeProductGroupMnt • AuthorizeProductMapping • AuthorizeRefundOnline • AuthorizeRestrictions • AuthorizeRtFixDaysMaint • AuthorizeStatusMaint • AuthorizeTaxGrpMaint • AuthorizeTaxRuleMaint • AuthorizeTranslationMnt • AuthorizeUsrDefinedEvnts • CloseAccRoleHeadMnt

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• CloseAccntPeriod • CloseAuthContAmend • CloseBranchTreasury • CloseCustAddMaint • CloseCustCategoryMnt • CloseCustEntity • CloseCustMaint • CloseExpenseGrpMnt • CloseFCHOL • CloseHostParameter • CloseIndustryMaint • CloseInterestClassMaint • CloseInterestLimits • CloseLDDDRYET • CloseLoanParameters • CloseMsgFormatMaint • CloseMsgRightsMnt • CloseMsgTypMaint • CloseObligorRiskRate • ClosePartyTypeDef • CloseProduct • CloseProductFields • CloseProductGroupMnt • CloseProductMapping • CloseRestrictions • CloseRtFixDaysMaint • CloseStatusMaint • CloseTaxGrpMaint • CloseTaxRuleMaint • CloseTranslationMnt • CloseUsrDefinedEvnts • CreateAccRoleHeadMnt • CreateAccntPeriod • CreateAuthContAmend • CreateBCDetails • CreateBranchTreasury • CreateCLASS • CreateContract • CreateContractInactive • CreateContractSim • CreateContractVerRoll • CreateCustAddMaint • CreateCustCategoryMnt • CreateCustEntity • CreateCustMaint • CreateDisbursement • CreateExPmtResponse • CreateExResponse • CreateExpenseGrpMnt • CreateFCHOL

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• CreateHostParameter • CreateIFProductPop • CreateIndustryMaint • CreateInterestClassMaint • CreateInterestLimits • CreateLDDDRYET • CreateLoanLossRsv • CreateLoanOSAmount • CreateLoanParameters • CreateMsgFormatMaint • CreateMsgRightsMnt • CreateMsgTypMaint • CreateMultiLoanPayment • CreateObligorRiskRate • CreatePartyTypeDef • CreatePayment • CreatePaymentSIM • CreateProduct • CreateProductFields • CreateProductGroupMnt • CreateProductMapping • CreateRefundOnline • CreateRestrictions • CreateRtFixDaysMaint • CreateStatusMaint • CreateTaxGrpMaint • CreateTaxRuleMaint • CreateTranslationMnt • CreateUsrDefinedEvnts • DeleteAccRoleHeadMnt • DeleteAccntPeriod • DeleteAuthContAmend • DeleteBranchTreasury • DeleteContAmend • DeleteContract • DeleteContractInactive • DeleteContractVerRoll • DeleteCustAddMaint • DeleteCustCategoryMnt • DeleteCustEntity • DeleteCustMaint • DeleteDisbursement • DeleteExpenseGrpMnt • DeleteFCHOL • DeleteHostParameter • DeleteIndustryMaint • DeleteInterestClassMaint • DeleteInterestLimits • DeleteLoanParameters • DeleteMsgFormatMaint

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• DeleteMsgRightsMnt • DeleteMsgTypMaint • DeleteMultiLoanPayment • DeleteOLDMSCDT • DeleteObligorRiskRate • DeletePartyTypeDef • DeletePayment • DeleteProduct • DeleteProductFields • DeleteProductGroupMnt • DeleteProductMapping • DeleteRefundOnline • DeleteRestrictions • DeleteRtFixDaysMaint • DeleteStatusMaint • DeleteTaxGrpMaint • DeleteTaxRuleMaint • DeleteTranslationMnt • DeleteUsrDefinedEvnts • ModifyAccRoleHeadMnt • ModifyAccntPeriod • ModifyAuthContAmend • ModifyBCDetails • ModifyBranchTreasury • ModifyCLASS • ModifyContAmend • ModifyContAmendSim • ModifyContract • ModifyContractInactive • ModifyContractVerRoll • ModifyCustAddMaint • ModifyCustCategoryMnt • ModifyCustEntity • ModifyCustMaint • ModifyDisbursement • ModifyExPmtResponse • ModifyExResponse • ModifyExchRateAmnd • ModifyExpenseGrpMnt • ModifyFCHOL • ModifyHostParameter • ModifyIFProductPop • ModifyIndustryMaint • ModifyInterestClassMaint • ModifyInterestLimits • ModifyLDDDRYET • ModifyLoanLossRsv • ModifyLoanParameters • ModifyMsgFormatMaint • ModifyMsgRightsMnt

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• ModifyMsgTypMaint • ModifyOLDFCREV • ModifyOLDMSCDT • ModifyObligorRiskRate • ModifyPartyTypeDef • ModifyProduct • ModifyProductFields • ModifyProductGroupMnt • ModifyProductMapping • ModifyRestrictions • ModifyRtFixDaysMaint • ModifyStatusMaint • ModifyTaxGrpMaint • ModifyTaxRuleMaint • ModifyTranslationMnt • ModifyUsrDefinedEvnts • QueryAccRoleHeadMnt • QueryAccntPeriod • QueryAuthContAmend • QueryBillNoticeHist • QueryBranchTreasury • QueryCLASS • QueryCLOSURECHK • QueryContAmend • QueryContract • QueryContractEvent • QueryContractInactive • QueryContractVerRoll • QueryCorpCustView • QueryCustAddMaint • QueryCustCategoryMnt • QueryCustEntity • QueryCustLoanView • QueryCustMaint • QueryCustMaintenance • QueryCustinfo • QueryCustview • QueryDisbursement • QueryExchRateAmnd • QueryExpenseGrpMnt • QueryFCHOL • QueryHostParameter • QueryIndustryMaint • QueryIntDetails • QueryInterestClassMaint • QueryInterestLimits • QueryLDDDRYET • QueryLoanLossRsv • QueryLoanOSAmount • QueryLoanParameters

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• QueryMsgFormatMaint • QueryMsgRightsMnt • QueryMsgTypMaint • QueryOLDMSCDT • QueryOLProdList • QueryObligorRiskRate • QueryPartyTypeDef • QueryPayMtAuth • QueryPayment • QueryPckOLcontractList • QueryProduct • QueryProductFields • QueryProductGroupMnt • QueryProductMapping • QueryRefundOnline • QueryRestrictions • QueryRtFixDaysMaint • QueryStatusMaint • QueryTaxGrpMaint • QueryTaxRuleMaint • QueryTranslationMnt • QueryTrnInfo • QueryUsrDefinedEvnts • QueryViewMsg • ReopenAccRoleHeadMnt • ReopenAccntPeriod • ReopenAuthContAmend • ReopenBranchTreasury • ReopenCustAddMaint • ReopenCustCategoryMnt • ReopenCustEntity • ReopenCustMaint • ReopenExpenseGrpMnt • ReopenHostParameter • ReopenIndustryMaint • ReopenInterestClassMaint • ReopenInterestLimits • ReopenLDDDRYET • ReopenLoanParameters • ReopenMsgFormatMaint • ReopenMsgRightsMnt • ReopenMsgTypMaint • ReopenObligorRiskRate • ReopenPartyTypeDef • ReopenProduct • ReopenProductFields • ReopenProductGroupMnt • ReopenProductMapping • ReopenRestrictions • ReopenRtFixDaysMaint

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• ReopenStatusMaint • ReopenTaxGrpMaint • ReopenTaxRuleMaint • ReopenTranslationMnt • ReopenUsrDefinedEvnts • ReverseContAmend • ReverseContract • ReverseContractVerRoll • ReverseDisbursement • ReverseMultiLoanPayment • ReversePayment • ReverseRefundOnline • RolloverContract • RolloverContractVerRoll

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
OBCLLSService	This single service covering all the major operations through Webservices for LS Module.	• AuthorizeAdhocFeeLiqd • AuthorizeAuthContAmend • AuthorizeBorrowerProduct • AuthorizeBulkPayment • AuthorizeConsolRepc • AuthorizeConsolRepcAuth • AuthorizeConsolRoll • AuthorizeConsolRollAuth • AuthorizeContAmend • AuthorizeContract • AuthorizeCptyMnemonicMap • AuthorizeDDContract • AuthorizeDDVersionRoll • AuthorizeDeskMaintenance • AuthorizeDrawdownAuth • AuthorizeEXRateFx • AuthorizeFacilityOnline • AuthorizeFacilityOnlineAuth • AuthorizeFacilityProd • AuthorizeFeeAmendment • AuthorizeFeeLiqd • AuthorizeFeeLiqdAuth • AuthorizeInstruction • AuthorizeIntCompanyCust • AuthorizeLBDMENMC • AuthorizeLBOLMapping • AuthorizeLBPayment • AuthorizeLBPaymentAuth • AuthorizeLFDFRMNT • AuthorizeLFDRATES • AuthorizeLSRefundOnline • AuthorizeMarginAmendment • AuthorizeNamedAgentMaint • AuthorizePartTransfer • AuthorizeParticipantProduct • AuthorizePartyTransAuth • AuthorizePortfolioDets • AuthorizePortfolioExpCod • AuthorizePosIdentifier • AuthorizeRestructureCont • AuthorizeSLTBranchParam • AuthorizeSLTProdMap • AuthorizeSplitRepc • AuthorizeSplitRepcAuth • AuthorizeTrancheAuth • CloseBorrowerProduct • CloseCptyMnemonicMap • CloseDeskMaintenance • CloseFacilityProd • CloseInstruction

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• CloseIntCompanyCust • CloseLBOLMapping • CloseLBPayment • CloseNamedAgentMaint • CloseParticipantProduct • ClosePortfolioDets • ClosePortfolioExpCod • ClosePosIdentifier • CloseSLTBranchParam • CloseSLTProdMap • CreateAdhocFeeLiqd • CreateBorrowerProduct • CreateBulkPayment • CreateConsolRepc • CreateConsolRoll • CreateContract • CreateCptyMnemonicMap • CreateDDContract • CreateDDVersionRoll • CreateDeskMaintenance • CreateEXRateFx • CreateFacilityOnline • CreateFacilityProd • CreateFeeLiqd • CreateInstruction • CreateIntCompanyCust • CreateLBOLMapping • CreateLBPayment • CreateLFDFRMNT • CreateLFDRATES • CreateLSRefundOnline • CreateMarginAmendment • CreateMarkLiqd • CreateNamedAgentMaint • CreatePartTransfer • CreateParticipantProduct • CreatePortfolioDets • CreatePortfolioExpCod • CreatePosIdentifier • CreateRestructureCont • CreateSLTBranchParam • CreateSLTProdMap • CreateSplitRepc • DeleteAdhocFeeLiqd • DeleteBorrowerProduct • DeleteBulkPayment • DeleteConsolRepc • DeleteConsolRoll • DeleteContAmend • DeleteContract

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• DeleteCptyMnemonicMap • DeleteDDContract • DeleteDDVersionRoll • DeleteDeskMaintenance • DeleteEXRateFx • DeleteFacilityOnline • DeleteFacilityProd • DeleteFeeAmendment • DeleteFeeLiqd • DeleteInstruction • DeleteIntCompanyCust • DeleteLBDMENMC • DeleteLBOLMapping • DeleteLBPayment • DeleteLFDFRMNT • DeleteLSRefundOnline • DeleteMarginAmendment • DeleteNamedAgentMaint • DeletePartTransfer • DeleteParticipantProduct • DeletePortfolioDets • DeletePortfolioExpCod • DeletePosIdentifier • DeleteRestructureCont • DeleteSLTBranchParam • DeleteSLTProdMap • DeleteSplitRepc • ModifyAdhocFeeLiqd • ModifyBorrowerProduct • ModifyBulkPayment • ModifyConsolRoll • ModifyContAmend • ModifyContract • ModifyCptyMnemonicMap • ModifyDDContract • ModifyDDVersionRoll • ModifyDeskMaintenance • ModifyEXRateFx • ModifyFacilityOnline • ModifyFacilityProd • ModifyFeeAmendment • ModifyFeeLiqd • ModifyInstruction • ModifyIntCompanyCust • ModifyLBDMENMC • ModifyLBOLMapping • ModifyLBPayment • ModifyLFDFRMNT • ModifyLFDRATES • ModifyLSRefundOnline

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• ModifyMarginAmendment • ModifyMarkLiqd • ModifyNamedAgentMaint • ModifyPartTransfer • ModifyParticipantProduct • ModifyPortfolioDets • ModifyPortfolioExpCod • ModifyPosIdentifier • ModifyRestructureCont • ModifySLTBranchParam • ModifySLTProdMap • QueryAdhocFeeLiqd • QueryAuthContAmend • QueryBorrowerLimit • QueryBorrowerProduct • QueryBulkPayment • QueryConsolRepc • QueryConsolRepcAuth • QueryConsolRoll • QueryConsolRollAuth • QueryContAmend • QueryContract • QueryCptyMnemonicMap • QueryDDContract • QueryDDVersionRoll • QueryDeskMaintenance • QueryDrawdownAuth • QueryEXRateFx • QueryFacilityOnline • QueryFacilityOnlineAuth • QueryFacilityProd • QueryFeeAmendment • QueryFeeLiqd • QueryFeeLiqdAuth • QueryInstruction • QueryIntCompanyCust • QueryLBDMENMC • QueryLBOLMapping • QueryLBPayment • QueryLBPaymentAuth • QueryLFDFRMNT • QueryLFDRATES • QueryLSRefundOnline • QueryMarginAmendment • QueryMarkLiqd • QueryNamedAgentMaint • QueryPartTransfer • QueryParticipantCont • QueryParticipantProduct • QueryPartyTransAuth

Table 2-1 (Cont.) List of Services

Service Name	Description	Operation
		• QueryPortfolioDets • QueryPortfolioExpCod • QueryPosIdentifier • QueryRestructureCont • QuerySLTBranchParam • QuerySLTProdMap • QuerySplitRepc • QuerySplitRepcAuth • QueryTrancheAuth • ReopenBorrowerProduct • ReopenCptyMnemonicMap • ReopenDeskMaintenance • ReopenFacilityProd • ReopenInstruction • ReopenIntCompanyCust • ReopenLBOLMapping • ReopenLBPayment • ReopenNamedAgentMaint • ReopenParticipantProduct • ReopenPortfolioDets • ReopenPortfolioExpCod • ReopenPosIdentifier • ReopenSLTBranchParam • ReopenSLTProdMap • ReverseAdhocFeeLiqd • ReverseBulkPayment • ReverseConsolRepc • ReverseConsolRoll • ReverseContAmend • ReverseContract • ReverseDDContract • ReverseDDVersionRoll • ReverseFacilityOnline • ReverseFeeLiqd • ReverseLBPayment • ReverseLSRefundOnline • ReversePartTransfer • ReverseRestructureCont • ReverseSplitRepc • SummaryQueryLFDFRMNT • SummaryQueryLFDRATES • SummaryQueryParticipantProduct

2.12 List of Interfaces

Table 2-2 List of Interfaces

Interfaces	Description	Security Considerations
Generic Interface	This Generic Interface called **GI**, streamline the incoming / outgoing data between Oracle Banking Corporate Lending system and external systems using batch mechanism (flat files)	Refer topic *Securing Gateway Services in Security Measure Documents*.