

Security Guide
Oracle Banking Virtual Account Management
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Oracle Banking Virtual Account Management Security Guide

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Table of Contents

1. ABOUT THIS MANUAL.....	1-1
1.1 PURPOSE.....	1-1
1.2 AUDIENCE	1-1
1.3 SCOPE.....	1-1
1.3.1 Read Sections Completely.....	1-1
1.3.2 Understand the Purpose of this Guidance	1-1
1.3.3 Limitations.....	1-1
1.3.4 Test in Non-Production Environment	1-1
2. PREREQUISITE	2-1
2.1 OPERATING ENVIRONMENT SECURITY	2-1
2.2 NETWORK SECURITY	2-1
2.3 ORACLE DATABASE SECURITY	2-1
2.3.1 Oracle Banking Virtual Account Management Recommended configuration	2-1
2.4 APPLICATION SERVER SECURITY.....	2-2
2.5 CHOICE OF THE SSL CIPHER SUITE	2-2
2.6 SECURING THE ORACLE BANKING VIRTUAL ACCOUNT MANAGEMENT APPLICATIONS	2-3
2.6.1 Token Management.....	2-3
2.6.2 Two-way SSL Connection	2-5
3. SECURING ORACLE BANKING VIRTUAL ACCOUNT MANAGEMENT.....	3-1
3.1 DESKTOP SECURITY	3-1
3.2 ORACLE BANKING VIRTUAL ACCOUNT MANAGEMENT CONTROLS	3-1
3.2.1 Overview.....	3-1
3.2.2 Disable Logging.....	3-1
3.2.3 Authentication and Authorization.....	3-1
3.2.4 Role Based Access Controls	3-1
3.2.5 Access Controls - Branch Level.....	3-2
3.2.6 Maker - Checker	3-2
3.2.7 Access Enforcement.....	3-2
4. GENERAL INFORMATION.....	4-1
4.1 CRYPTOGRAPHY	4-1
4.2 SECURITY PATCH.....	4-1
4.3 ORACLE DATABASE SECURITY SUGGESTIONS.....	4-1
4.3.1 Access Control.....	4-1
4.3.2 Data Protection	4-1
4.3.3 Monitoring and Compliance.....	4-1
4.4 ORACLE SOFTWARE SECURITY ASSURANCE - STANDARDS	4-1
4.5 REFERENCES.....	4-2
4.5.1 Datacenter Security considerations.....	4-2
4.5.2 Database Security considerations.....	4-2
4.5.3 Security recommendations / practices followed for Database Environment	4-2
4.5.4 Common security considerations.....	4-2

1. About this Manual

1.1 **Purpose**

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

1.2 **Audience**

This guide is primarily intended for IT department or administrators deploying Oracle Banking Virtual Account Management 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 Virtual Account Management application.

1.3 **Scope**

1.3.1 **Read Sections Completely**

Each section should be read and understood completely. Instructions should never be blindly applied. Relevant discussion may occur immediately after instructions for an action, so be sure to read whole sections before beginning implementation.

1.3.2 **Understand the Purpose of this Guidance**

The purpose of the guidance is to provide security-relevant configuration recommendations. It does not imply the suitability or unsuitability of any product for any particular situation, which entails a risk decision.

1.3.3 **Limitations**

This guide is limited in its scope to security-related issues. This guide does not claim to offer comprehensive configuration guidance. For general configuration and implementation guidance refer to other sources such as Vendor specific sites.

1.3.4 **Test in Non-Production Environment**

To the extent possible, guidance should be tested in a non-production environment before deployment.
Ensure that any test environment simulates the configuration in which the application will be deployed as closely as possible.

2. Prerequisite

2.1 Operating Environment Security

Refer the vendor specific documentation for making the environment more safe and secured.

2.2 Network Security

Refer the vendor specific documentation for making the environment more safe and secured.

2.3 Oracle Database Security

Refer the Oracle Database Security specification document for making the environment more safe and secured.

2.3.1 Oracle Banking Virtual Account Management Recommended configuration

This section contains security recommendations for the Database used for Oracle Banking Virtual Account Management.

Init.ora	REMOTE_OS_AUTHENT=FALSE	Authentication
Init.ora	TRACE_FILES_PUBLIC=FALSE	Authorization
Init.ora	REMOTE_OS_ROLES=FALSE	Authorization
Init.ora	O7_DICTIONARY_ACCESSIBILITY = FALSE	Authorization
Init.ora	AUDIT_TRAIL = OS	Audit
Init.ora	AUDIT_FILE_DEST = E:\logs\db\audit	Audit
To audit sessions	SQL> audit session;	Audit
To audit schema changes	SQL> audit user;	Audit

To audit other events	SQL> AUDIT DATABASE LINK; - Audit create or drop database links SQL> AUDIT PUBLIC DATABASE LINK; - Audit create or drop public database links SQL> AUDIT SYSTEM AUDIT; - Audit statements themselves SQL> AUDIT ALTER ANY ROLE by ACCESS; - Audit alter any role statements SQL> AUDIT ALTER DATABASE by ACCESS; - Audit alter database statements SQL> AUDIT ALTER SYSTEM by ACCESS; - Audit alter system statements SQL> AUDIT CREATE ROLE by ACCESS; - Audit create role statements SQL> AUDIT DROP ANY ROLE by ACCESS; - Audit drop any role statements SQL> AUDIT PROFILE by ACCESS; - Audit changes to profiles SQL> AUDIT PUBLIC SYNONYM by ACCESS; - Audit public synonyms statements SQL> AUDIT SYSDBA by ACCESS; - Audit SYSDBA privileges SQL> AUDIT SYSOPER by ACCESS; - Audit SYSOPER privileges SQL> AUDIT SYSTEM GRANT by ACCESS; - Audit System grant privileges	Audit
-----------------------	--	-------

To audit the events, login through sqlplus as SYSTEM and issue the commands.

2.4 Application Server Security

Refer the Oracle WebLogic Security specification document for making the environment more safe and secured.

Support for LDAP (External Password Authentication)

Oracle Banking Virtual Account Management supports authentication through LDAP without the use of SSO.

Depending on the values of the property maintained at SECURITY_CONFIG (in platform configurations) application connects to the LDAP server and validates the user credentials.

Support for SSL (Secure Transformation of Data)

The Oracle Banking Virtual Account Management to be configured that all HTTP connections to the application are over SSL/TLS. In other words, all HTTP traffic in the clear will be prohibited; only HTTPS traffic will be allowed. It is highly recommended to enable this option in a production environment, especially when WebLogic Server acts as the SSL terminator.

2.5 Choice of the SSL Cipher Suite

Oracle WebLogic Server allows for SSL clients to initiate a SSL connection with a null cipher suite. The null cipher suite does not employ any bulk encryption algorithm thus resulting in transmission of all data in clear text, over the wire.

The default configuration of Oracle WebLogic Server is to disable the null cipher suite. Ensure that the usage of the null cipher suite is disabled, preventing any client from negotiating an insecure SSL connection.

Furthermore, for installations having regulatory requirements requiring the use of only 'high' cipher suites, Oracle WebLogic Server can be configured to support only certain cipher suites. The restriction can be done in config.xml of the WebLogic domain. Provided below is an example config.xml restricting the cipher suites to those supporting 256-bit symmetric keys or higher, and using RSA for key exchange.

```
....
<ssl>
    <enabled>true</enabled>
    <ciphersuite>TLS_RSA_WITH_AES_256_CBC_SHA</ciphersuite>
</ssl>
....
```

- Configuration of WebLogic Server to support the above defined cipher suites might also require an additional command line argument to be passed to WebLogic Server, so that a FIPS 140-2 compliant crypto module is utilized. This is done by adding - **Dweblogic.security.SSL.nojce=true** as a JVM argument.
- The restriction on cipher suites needs to be performed for every managed server.
- The order of cipher suites is important – Oracle WebLogic Server chooses the first available cipher suite in the list, that is also supported by the client.
- Cipher suites with RC4 are enabled despite it being second best to AES. This is primarily for older clients that do not support AES (for instance, Microsoft Internet Explorer 6, 7 and 8 on Windows XP).

2.6 Securing the Oracle Banking Virtual Account Management Applications

The following guidelines serve to secure the Oracle Banking Virtual Account Management application deployed on Oracle WebLogic Server.

2.6.1 Token Management

Oracle Banking Virtual Account Management uses JWT for authentication of the service request within its platform security module.

Platform security module enables securing Api micro services with JWT (JSON Web Tokens). JSON Web Tokens are an open, industry standard RFC 7519 method for representing claims securely between two parties. JSON Web Token (JWT) is a compact, URL-safe means of representing claims to be transferred between two parties. The claims in a JWT are encoded as a JSON object that is used as the payload of a JSON Web Signature (JWS) structure or as the plaintext of a JSON Web Encryption (JWE) structure, enabling the claims to be digitally signed.

Advantages of JWTs

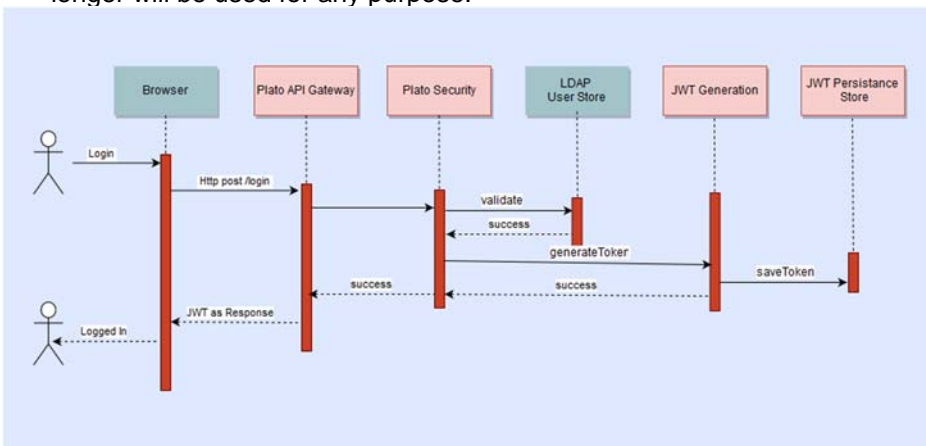
- No Session to Manage (stateless): The JWT is a self-contained token which has authentication information, expire time information, and other user defined claims digitally signed.
- Portable: A single token can be used with multiple backends.
- No Cookies Required, So It's Very Mobile Friendly
- Good Performance: It reduces the network round trip time.
- Decoupled/Decentralized: The token can be generated anywhere. Authentication can happen on the resource server, or easily separated into its own server.

Platform Security JWT:

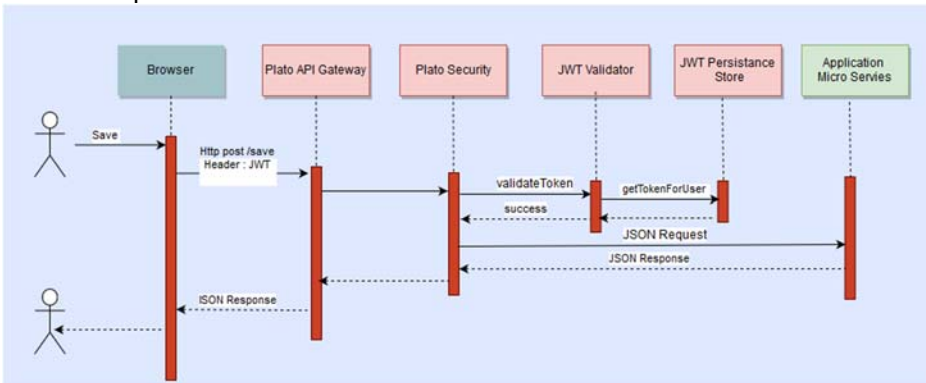
- Authentication: User first signs into the authentication server using the credentials. Platform security module tenant ledger maintains the tenant

preferable user store configuration accordingly spring authentication manager validates the credentials with the user Store. At present Platform security module supports two user store (LDAP and legacy table based user store). Upon success authentication Platform security module invokes the JWT utility to generate the tokens and that send as response to the login request to browser. (Refer the sequence diagram)

- Token Store: To increase the security and better usability, every authentication/refresh request is secured by random unique key. The generated token and the secure key are persisted in the table, so that during the horizontal scaling of the servers, any API gateway instance can serve for the request.
- Cipher strength: Platform security module hashes the JWT footer with HS512 algorithm.
- Refresh Token: Users allowed to get the new token any time before expiring the existing token.
- Logout: While user calls the logout operation, platform security module clears the issued token and deletes the record from the table as well. The old token no longer will be used for any purpose.



Any consequent request to business Apis, expects an authorization token in the HTTP Header, Platform security filters, validates the JWT, upon successful validation, it allows to execute the business Apis.



- Claims: The JWT Claims Set represents a JSON object whose members are the claims conveyed by the JWT. Platform security module validates below claims during the process.

Claim Name	Description	Mandatory	Type
iss	Issuer	Yes	Registered
sub	Subject	Yes	Registered
aud	Audience	No	Registered

exp	Expiration Time	Yes	Registered
nbf	Not Before	No	Registered
iat	Issued At	Yes	Registered
jti	JWT Id	Yes	Registered
tid	Tenant Id	Yes	Private

- Securing JWT: JWT must be encrypted using a key, this key should be persisted in table, hence while horizontal scaling or clustering, all weblogic instances able to serve for the token issued by each other.
- Token Expiry: Platform security module invalidates the token, if the client submits after the Expiration time. In addition, token becomes invalid, if the user password changed after the token issuance.

2.6.2 Two-way SSL Connection

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, must have two certificates, one for the server and the other for client.

3. Securing Oracle Banking Virtual Account Management

3.1 Desktop Security

Refer the vendor specific relevant sections for securing the Desktops Operating system. Also do refer the Browser specific security settings mentioned in the vendor specific docs.
Refer the client browser setting required for FCUBS.

3.2 Oracle Banking Virtual Account Management Controls

3.2.1 Overview

This chapter describes the various programs available within Oracle Banking Virtual Account Management, to help in the maintenance of security.
Access to the system is possible only if the user logs in with a valid ID and the correct password. The activities of the users can be reviewed by the Security Officer in the Event Log and the Violation Log reports.

3.2.2 Disable Logging

It is recommended that the debug logging facility of the application be turned off, once the system is in production. This is achieved by updating the logback.xml file of the application.

3.2.2.1 Sign-on Messages

Message	Explanation
User Authentication Failed	An incorrect user ID or password was entered.
User Status is Locked. Please contact your System Administrator	The user profile has been disabled 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).

3.2.3 Authentication and Authorization

First, only authorized users can access the system with the help of a unique User ID and a password. Secondly, a user should have access rights to execute a function.
The user profile of a user contains the User ID, the password and the functions to which the user has access. Oracle Banking Virtual Account Management operation such as new, copy, query, unlock and so on will be enabled based on function rights available for the user. The function rights will be checked for each operation performed by the user, in Security Management Service module of Oracle Banking Virtual Account Management.

3.2.4 Role Based Access Controls

- Application level access has implemented via the Security Management System (SMS) module.
- SMS supports "ROLE BASED" access of Screens and different types of operations.
- Oracle Banking Virtual Account Management supports dual control methodology, wherein every operation performed has to be authorized by another user with the requisite rights.

- SMS provides an option to map multiple roles for a user in a given branch. Allowed operations are mapped to the roles and SMS authorizes the user based on it.

3.2.5 Access Controls - Branch Level

- SMS provides the branch level access through the roles provided for the user at a particular branch

3.2.6 Maker - Checker

Application supports dual control methodology, wherein every operation performed has to be authorized by another user with the requisite rights.

On these user- roles mapping the user will have access to different functions.

3.2.7 Access Enforcement

Access management in Oracle Banking Virtual Account Management's Security Management Service, can be done in four steps.

- Branch level: In such a case the user cannot view even the menu list of the Oracle Banking Virtual Account Management when he tries to login into the restricted branch. Thus, no transactions could be performed
- Roles wise: As described above basing on the user-roles mapping, the user can access different functions of Oracle Banking Virtual Account Management. For an example, a bank clerk will have access to customer creation, account opening, term-deposits opening and liquidation screens, but he will not have access to User Creation function activity.

3.2.7.1 Invalid Logins

In Oracle Banking Virtual Account Management user should specify the allowable number of times an invalid login attempt is made by a user. Each user accesses the system through a unique User ID and password. While logging on to the system, if either the User Id or the Password is wrong, it amounts to an invalid login attempt.

By default, the allowable number of cumulative invalid attempts is six, and the allowable number of consecutive invalid attempts is three. These default values can be changed and specify the allowable number of attempts in each case. An allowable number for cumulative attempts are between 6 and 99, and for consecutive (successive) attempts are between 3 and 5.

When authentication of credentials is unsuccessful due to an incorrect user ID, then the user id will not be logged in the audit logs. In case the user id is correct and the password is wrong, the attempt is logged in the audit log and the successive and cumulative failure count is incremented. When the user id and password are correct, this is logged into the audit logs.

3.2.7.2 Specifying Parameter

Dormancy Days

Oracle Banking Virtual Account Management allows you to automatically disable the profile of all the users who have not logged into the system for a pre-defined period of time. A user ID is considered dormant if the difference between the last login date and the current date is equal to or greater than the number of 'Dormancy Days' that has been specified. This is reckoned in calendar days that is, inclusive of holidays. All dormant users (whose home branch is same as the current branch) are disabled during the end of day run at the current branch.

4. General Information

4.1 Cryptography

Oracle Banking Virtual Account Management's Platform security service uses cryptography to protect the sensitive data.

It uses hashing algorithm while storing user passwords. SHA-2 family hashing algorithm is used for the purpose. This is applicable for

- Credentials used for integration with other applications which will happen through OAUTH.
- Credentials to access the LDAP server (where user credentials are stored)

For encryption, AES, which is considered to be of gold standard, is used. It produces a key size of 256 bits when it comes to symmetric key encryption.

4.2 Security patch

Security patches must be applied whenever it's available for the applicable product version.

4.3 Oracle Database Security Suggestions

4.3.1 Access Control

Database Vault (DV) Provides enterprises with protection from the insider threats and in advantage leakage of sensitive application data. Access to application data by users and administrators is controlled using DV realms, command rules and multi factor authorization. DV also address Access privilege by separating responsibilities.

4.3.2 Data Protection

Advance Security provides the most advance encryption capabilities for protecting sensitive information without requiring any change to the application. TDE is native database solution that is completely transparent to the existing applications.

Advance Security also provides strong protection for data in transit by using network encryption capabilities. Features like Easy to deploy, Ensure secure by default to accept communication from client using encryption, Network encryption using SSL/TLS.

4.3.3 Monitoring and Compliance

Audit Vault (AV) transparently collects and consolidate audit data from multiple databases across the enterprise, does provide valuable insight into who did what with which data & when including privilege users. The integrity of the audit data is ensured using controls including DV, Advance Security. Access to AV data is strictly controlled. It also does provide graphical summaries of activity causing alerts, in addition database audit setting are centrally managed and monitored.

4.4 Oracle Software Security Assurance - Standards

Every acquired organization must complete the Mergers and Acquisitions (M&A) Security Integration process. The issues identified during this review must be addressed according to the agreed upon M&A remediation plan. The acquired organization must complete SPOC assignments and plan integration of OSSA methodologies and processes into its SDLC.

4.5 **References**

4.5.1 **Datacenter Security considerations**

Refer to the following links to understand Datacenter Security considerations
http://docs.oracle.com/cd/B14099_19/core.1012/b13999/rectop.htm

4.5.2 **Database Security considerations**

Refer the below links to understand more on Database Security considerations recommended to be followed

<http://www.oracle.com/us/products/database/security/overview/index.html>
<http://www.oracle.com/technetwork/database/security/twp-security-checklist-database-1-132870.pdf>

4.5.3 **Security recommendations / practices followed for Database Environment**

Refer the below mentioned links to understand more on Security recommendations/practices followed for Database Environment

http://docs.oracle.com/cd/B28359_01/network.111/b28531/guidelines.htm

4.5.4 **Common security considerations**

Refer below links to understand some of the common security considerations to be followed:

http://docs.oracle.com/cd/B14099_19/core.1012/b28654.pdf
http://docs.oracle.com/cd/E14899_01/doc.9102/e14761/tuningforappserver.htm
http://docs.oracle.com/cd/E13222_01/wls/docs81b/lockdown/practices.html
http://docs.oracle.com/cd/E23943_01/web.1111/e14529/security.htm
<http://www.oracle.com/us/solutions/oos/weblogic-server/overview/index.html>