

Oracle® Life Sciences Clinical One Platform Security Guide



Release 24.1

F95739-01

May 2024

The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

ORACLE®

Oracle Life Sciences Clinical One Platform Security Guide, Release 24.1

F95739-01

Copyright © 2017, 2024, Oracle and/or its affiliates.

Primary Author: Oracle Life Sciences Documentation Team

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software, software documentation, data (as defined in the Federal Acquisition Regulation), or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software," "commercial computer software documentation," or "limited rights data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle®, Java, MySQL and NetSuite are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

Preface

Documentation accessibility	vi
Diversity and Inclusion	vi
Related resources	vi
Access to Oracle Support	vi
Additional copyright information	vii

1 Security overview

OWASP top ten security vulnerabilities for 2017	1-1
Security awareness and education	1-1
The risk associated with build-your-own	1-2
Other aspects of security	1-2

2 Top ten security risks for 2017

Overview of the OWASP top ten list	2-1
#1 - Injection	2-1
Valid content types	2-2
SQL injection	2-2
XML injection	2-2
#2 - Broken authentication	2-2
#3 - Sensitive data exposure	2-2
#4 - XML external entities (XXE)	2-3
#5 - Broken access control	2-3
#6 - Security misconfiguration	2-3
#7 - Cross-site scripting (XSS)	2-3
#8 - Insecure deserialization	2-3
#9 - Using components with known vulnerabilities	2-3
#10 - Insufficient logging and monitoring	2-4

3 Summary

4 Revision history

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through Support Cloud.

Contact our Oracle Customer Support Services team by logging requests in one of the following locations:

- English interface Customer Support Portal (<https://hsgbu.custhelp.com/>)
- Japanese interface Customer Support Portal (<https://hsgbu-jp.custhelp.com/>)

You can also call our 24x7 help desk. For information, visit <https://www.oracle.com/life-sciences/support/> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Preface

This preface contains the following sections:

- [Documentation accessibility](#)
- [Diversity and Inclusion](#)
- [Related resources](#)
- [Access to Oracle Support](#)
- [Additional copyright information](#)

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>.

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

All documentation and other supporting materials are available on the [Oracle Help Center](#).

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Additional copyright information

This documentation may include references to materials, offerings, or products that were previously offered by Phase Forward Inc. Certain materials, offerings, services, or products may no longer be offered or provided. Oracle and its affiliates cannot be held responsible for any such references should they appear in the text provided.

1

Security overview

- [OWASP top ten security vulnerabilities for 2017](#)
- [Security awareness and education](#)
- [The risk associated with build-your-own](#)
- [Other aspects of security](#)

OWASP top ten security vulnerabilities for 2017

To guide developers on what they need to protect against, the Open Web Application Security Project (OWASP) publishes a document that lists the ten most critical security vulnerabilities identified for the year. Addressing these ten security vulnerabilities does not provide for total security, but is a good start in raising awareness on the current major security threats.

This document explains how the Oracle Clinical One Platform API addresses security vulnerabilities, identifies the controls within the Oracle Clinical One Platform API that are used or may be used to address the associated risks, and describes how API developers should address security vulnerabilities and risks documented by OWASP for 2017.

In some cases, the controls are coded into the product and proper use of the controls by API developers is necessary to validate the integrity of the controls. Developers using the Oracle Clinical One Platform API should use this document along with the [Oracle Cloud SaaS Security Practices](#) (download link available for registered users in the [Oracle Cloud Operations Center](#) on My Oracle Support, Doc ID 1541346.2) to identify the necessary security controls to maintain the risk posture of the API interface while integrating with Oracle Clinical One Platform.

Security awareness and education

The best application security that money can buy is education. Developers and project leads must be mindful of potential security issues and have an understanding of secure coding practices. Training must include an in-depth explanation of the potential risks, as well as features of the development and deployment platforms that help mitigate exploits.

The most important design principle for application security is to implement security by design and default. Secure coding guidelines should be made available, adhered to, and enforced in all development organizations, irrespective of the tools and platforms being used.

A good example of security by default is the expectation that we all have for how elevators behave in case of a power outage. Instead of releasing the brakes, we expect elevators to apply the brakes for the safety of passengers in the cabin. But how would the elevator know that it should apply the brakes if no one defined this as the default behavior? So before thinking about how to prevent external attacks, it makes sense to identify secure defaults for an application to protect it from the inside. This, however, does not work well without training and awareness.

The risk associated with build-your-own

Developers don't always find the security they need for an application within the security toolset provided by a platform or built into a framework. As a result, build-your-own-security is not uncommon among development projects. This is especially true if the application is a replacement of an existing system that uses a specific non-standard security infrastructure. An example for this is database-table-based authentication and authorization in combination with user provisioning and resource granting at runtime.

The risk associated with building your own security is that you are also on your own when it comes to quality assurance of the security layer, application security propagation, and single sign-on; and you are responsible for bug fixing and maintenance of the security layer.

Not all developers are security experts, but experts are what it takes to build a custom security layer.

Time spent investigating existing, well-vetted security solutions is probably time well spent. Existing solutions can be applied to custom applications more easily and more cost-effectively than creating an error-prone, self-written mechanism.

Other aspects of security

Application security is useless if the application itself runs in an insecure environment. Perimeter security describes the levels of protection that are added on servers, the network, and other data access channels outside of the API domain. As can be seen in this document, not all of the OWASP top ten security vulnerabilities documented for 2017 are relevant for application developers for specific implementations.

2

Top ten security risks for 2017

- [Overview of the OWASP top ten list](#)
- [#1 - Injection](#)
- [#2 - Broken authentication](#)
- [#3 - Sensitive data exposure](#)
- [#4 - XML external entities \(XXE\)](#)
- [#5 - Broken access control](#)
- [#6 - Security misconfiguration](#)
- [#7 - Cross-site scripting \(XSS\)](#)
- [#8 - Insecure deserialization](#)
- [#9 - Using components with known vulnerabilities](#)
- [#10 - Insufficient logging and monitoring](#)

Overview of the OWASP top ten list

The listed security threats are probably the most severe threats and application developers have to be aware of and protect against these threats.

For more information, see the following:

- OWASP home page: https://www.owasp.org/index.php/Main_Page
- General descriptions for the OWASP top ten list of security risks for 2017: https://www.owasp.org/index.php/Top_10-2017_Top_10
- Overview of the security risks: <https://owasp.org/Top10/>

#1 - Injection

Injection vulnerabilities can occur when data is sent to an interpreter via an interface specification and the party submitting the data does not check the data to ensure that the interpreter performs only the expected actions on the data.

SQL, Code, Command, Log, Path Transversal (XML) are all possible types of injection based upon the interpreter used in the container.

- [Valid content types](#)
- [SQL injection](#)
- [XML injection](#)

Valid content types

The Oracle Clinical One Platform suite is a microservice-based application built on JAX-RS libraries and hosted in Oracle Life Sciences Cloud (also known as GBUCS).

Developers must use `@Produces` to handle different Content-Type. Also consider placing `@Valid` annotation for handling parameters during invocation itself.

SQL injection

The Oracle Clinical One Platform API passes different parameters as bind variables into the named queries, which makes SQL injection impossible.

XML injection

The Oracle Clinical One Platform Data API handles XML injections by using an XML parser library built within the core framework. During integration with other external systems, we recommend that you extend this XML parser library and verify if the definition or constraint for data type and length are accurately met.

#2 - Broken authentication

Risks associated with broken authentication and session management are often due to these functions not being implemented properly. As previously stated, custom authentication mechanisms should not be implemented and have not been implemented. Since the Oracle Clinical One Platform API works in a stateless manner, all inbound requests must either carry a valid JWT token, or perform basic authentication.

The JWT token is encrypted with the necessary algorithm, in accordance with security standards, and it carries the necessary information (expiry, user, principals) in its payload.

When using basic authentication, always transmit credentials over a secure channel.

Credentials are not stored or logged in the Oracle Clinical One Platform system at any point in time.

The Oracle Clinical One Platform API also performs fine-grained authorization for the user to ensure that only a user with the appropriate roles is allowed to access the REST web service endpoints.

#3 - Sensitive data exposure

Not all data is public and we advise that you hide any sensitive information from unauthorized users. Failure in security configuration and the selection of insecure defaults may pose a risk of data leakage.

Developers should use TLS 1.2 or above to consume the Oracle Clinical One Platform API to protect sensitive data and address Man-in-the-Middle attacks.

Web client developers should enforce encrypted data transport when the application transports sensitive data and should validate that all certificates are legitimate and signed by public authorities. Ciphers should be restricted to modern implementations.

#4 - XML external entities (XXE)

The Oracle Clinical One Platform API does not use XML for any kind of interaction. However, there is a JAXB implementation available within the core library where XML external entity support has been programmatically turned off as a precaution. We recommend that you implement a similar approach based on recommendations from the [OWASP XXE Prevention Cheat Sheet](#).

#5 - Broken access control

All Oracle Clinical One Platform API endpoints enforce fine-grained authorization for the user, to ensure that only a user with the appropriate roles is allowed to access the REST web service endpoints.

#6 - Security misconfiguration

The Oracle Clinical One Platform suite is always installed in a secure-by-default state in the production environment. Default server users are disabled, and unused ports are blocked as part of deployment. Any communication to Oracle Clinical One Platform application servers happens through the Oracle Life Sciences IAMS, and the OHSIAMS WebGate monitors each API call for authentication details.

As part of standard protocol, black box testing is regularly carried out to detect any possible misconfiguration issues. Possible issues are addressed in either the source code or the infrastructure by applying critical patches.

#7 - Cross-site scripting (XSS)

Cross-site scripting occurs chiefly due to browser presentation of data. Input data to the Oracle Clinical One Platform API is always passed through an initialization request filter located within its core library. This filter looks for suspicious or harmful characters, and blocks requests if needed. All outbound responses are decorated with an `X_FRAME_OPTIONS` header to prevent clickjacking.

#8 - Insecure deserialization

The Oracle Clinical One Platform API validates all inbound requests and serializable objects at multiple levels. No data persists at the middle-tier level. In addition, Oracle Clinical One Platform is hosted within the GBUCS cloud, further reducing the chances of a remote execution scenario. Therefore, insecure deserialization scenarios are not applicable for users of the Oracle Clinical One Platform API.

#9 - Using components with known vulnerabilities

The Oracle Clinical One Platform technology stack is constantly updated with the latest security fixes and patches. We recommend that developers using the API maintain their technology in the same way.

#10 - Insufficient logging and monitoring

All Oracle Clinical One Platform API calls pass through authorization service filters. These filters log any kind of unusual or unexpected behavior, which is shown in the centralized Kibana dashboard. Active monitoring of unexpected events is very important to identify and notify of active attacks so that preventive measures can be taken to address advanced persistent threats (APTs).

3

Summary

In summary, we've discussed the top ten vulnerabilities across the industry and, where applicable, described the security controls that are available to address these vulnerabilities in Oracle Clinical One Platform. Extending these controls into your interface and systems will maintain the security posture of the whole system. While addressing these ten security vulnerabilities does not provide for total security, it is a good start in raising awareness on the current major security threats.

We cannot cover all security vulnerabilities due to the large number of possibilities, but this document provides a list of some of the security controls that should be incorporated into your code to start with and should serve as a catalyst to initiate further investigation into addressing other possible vulnerabilities.

4

Revision history

Date	Part number	Description
May 2024	F95739-01	Original version of the document.