Communications Security Establishment | Centre de la sécurité des télécommunications

CANADIAN CENTRE FOR CYBER SECURITY

COMMON CRITERIA CERTIFICATION REPORT

Oracle Linux 8.4

12 April 2023

577-EWA

Canada

FOREWORD

This certification report is an UNCLASSIFIED publication, issued under the authority of the Chief, Communications Security Establishment (CSE).

The Information Technology (IT) product identified in this certification report, and its associated certificate, has been evaluated at an approved testing laboratory established under the Canadian Centre for Cyber Security (a branch of CSE). This certification report, and its associated certificate, applies only to the identified version and release of the product in its evaluated configuration. The evaluation has been conducted in accordance with the provisions of the Canadian Common Criteria Program, and the conclusions of the testing laboratory in the evaluation report are consistent with the evidence adduced.

This report, and its associated certificate, are not an endorsement of the IT product by Canadian Centre for Cyber Security, or any other organization that recognizes or gives effect to this report, and its associated certificate, and no warranty for the IT product by the Canadian Centre for Cyber Security, or any other organization that recognizes or gives effect to this report, and its associated certificate, is either expressed or implied.

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OVERVIEW

The Canadian Common Criteria Program provides a third-party evaluation service for determining the trustworthiness of Information Technology (IT) security products. Evaluations are performed by a commercial Common Criteria Testing Laboratory (CCTL) under the oversight of the Certification Body, which is managed by the Canadian Centre for Cyber Security.

A CCTL is a commercial facility that has been approved by the Certification Body to perform Common Criteria evaluations; a significant requirement for such approval is accreditation to the requirements of ISO/IEC 17025, the General Requirements for the Competence of Testing and Calibration Laboratories.

By awarding a Common Criteria certificate, the Certification Body asserts that the product complies with the security requirements specified in the associated security target. A security target is a requirements specification document that defines the scope of the evaluation activities. The consumer of certified IT products should review the security target, in addition to this certification report, to gain an understanding of any assumptions made during the evaluation, the IT product's intended environment, the evaluated security functionality, and the testing and analysis conducted by the CCTL.

The certification report, certificate of product evaluation and security target are posted to the Common Criteria portal (the official website of the International Common Criteria Program).

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Oracle Linux 8.4 (hereafter referred to as the Target of Evaluation, or TOE), from **Oracle Corporation** , was the subject of this Common Criteria evaluation. A description of the TOE can be found in Section 1.2. The results of this evaluation demonstrate that the TOE meets the requirements of the conformance claim listed in Section 1.1 for the evaluated security functionality.

EWA-Canada is the CCTL that conducted the evaluation. This evaluation was completed on **12 April 2023** and was carried out in accordance with the rules of the Canadian Common Criteria Program.

The scope of the evaluation is defined by the Security Target, which identifies assumptions made during the evaluation, the intended environment for the TOE, and the security functional/assurance requirements. Consumers are advised to verify that their operating environment is consistent with that specified in the security target, and to give due consideration to the comments, observations, and recommendations in this Certification Report.

The Canadian Centre for Cyber Security, as the Certification Body, declares that this evaluation meets all the conditions of the Arrangement on the Recognition of Common Criteria Certificates and that the product is listed on the Certified Products list (CPL) for the Canadian Common Criteria Program and the Common Criteria portal (the official website of the International Common Criteria Program).

1 IDENTIFICATION OF TARGET OF EVALUATION

The Target of Evaluation (TOE) is identified as follows:

Table 1: TOE Identification

TOE Name and Version	Oracle Linux 8.4
Developer	Oracle Corporation

1.1 COMMON CRITERIA CONFORMANCE

The evaluation was conducted using the Common Methodology for Information Technology Security Evaluation, Version 3.1 Revision 5, for conformance to the Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 5.

The TOE claims the following conformance:

Protection Profile for General Purpose Operating Systems Version 4.2.1

Functional Package for SSH Version 1.0

1.2 TOE DESCRIPTION

The TOE is a general purpose, multi-user, multi-tasking Linux based operating system. It provides a platform for a variety of applications. The TOE supports secure remote login and other secure network services over an untrusted network using Secure Shell (SSH).

1.3 TOE ARCHITECTURE

A diagram of the TOE architecture is as follows:

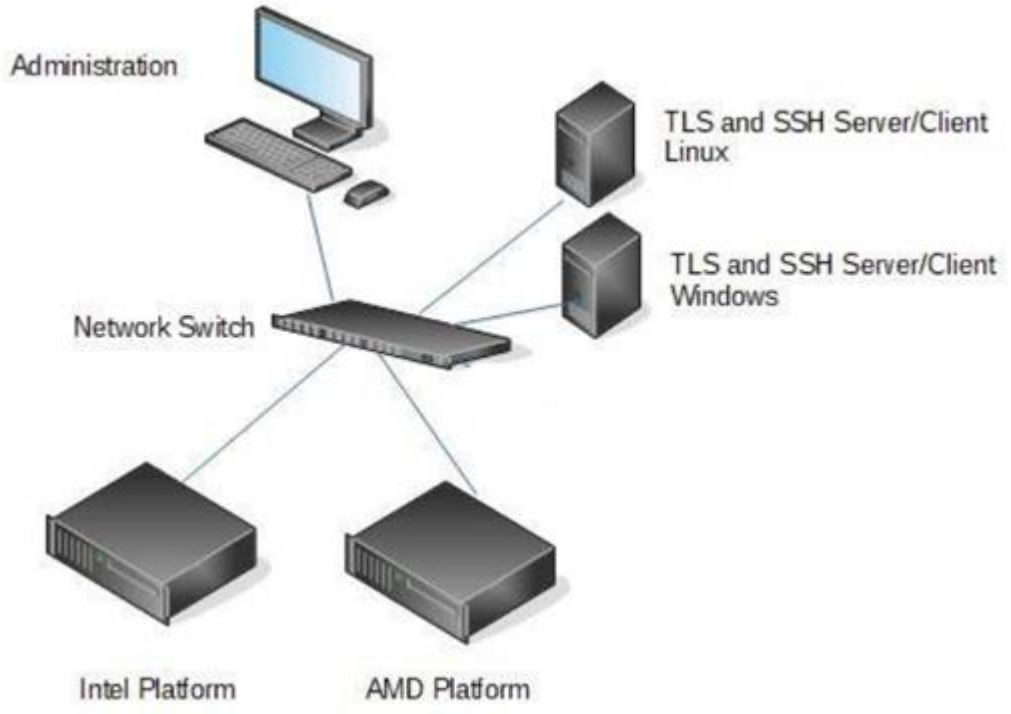

Figure 1: TOE Architecture

2 SECURITY POLICY

The TOE implements and enforces policies pertaining to the following security functionality:

- Audit Data Generation
- Cryptographic Support
- User Data Protection
- Identification and Authentication
- Security Management
- Protection of the TSF
- Trusted Path/Channels

Complete details of the security functional requirements (SFRs) can be found in the Security Target (ST) referenced in section 8.2.

2.1 CRYPTOGRAPHIC FUNCTIONALITY

The following cryptographic implementations are used by the TOE and have been evaluated by the CAVP:

Table 2: Cryptographic Implementations

Cryptographic Module/Algorithm	Certificate Number
OpenSSL (64 bit) (AESNI) vR8-8.6	A3381
OpenSSL (64 bit) (AESASM) vR8-8.6	A3382
OpenSSL (64 bit) (BAES_CTASM) vR8-8.6	A3383
OpenSSL (64 bit) (SSH_AVX2) vR8-8.6	A3385
OpenSSL (64 bit) (SSH_AVX) vR8-8.6	A3386
OpenSSL (64 bit) (SSH_SSSE3) vR8-8.6	A3387
OpenSSL (64 bit) (SSH_ASM) vR8-8.6	A3388
OpenSSL (64 bit) (AESNI_AVX) vR8-8.6	A3392
OpenSSL (64 bit) (AESNI_CLMULNI) vR8-8.6	A3393
OpenSSL (64 bit) (AESNI_ASM) vR8-8.6	A3394
OpenSSL (64 bit) (AESASM_AVX) vR8-8.6	A3395
OpenSSL (64 bit) (AESASM_CLMULNI) vR8-8.6	A3396
OpenSSL (64 bit) (AESASM_ASM) vR8-8.6	A3397
OpenSSL (64 bit) (BAES_CTASM_AVX) vR8-8.6	A3398
OpenSSL (64 bit) (BAES_CTASM_CLMULNI) vR8-8.6	A3399

Cryptographic Module/Algorithm	Certificate Number
OpenSSL (64 bit) (BAES_CTASM_ASM) vR8-8.6	A3400
OpenSSL (64 bit) (SHA_AVX2) vR8-8.6	A3401
OpenSSL (64 bit) (SHA_AVX) vR8-8.6	A3402
OpenSSL (64 bit) (SHA_SSSE3) vR8-8.6	A3403
OpenSSL (64 bit) (SHA_ASM) vR8-8.6	A3404
OpenSSL (64 bit) (FFC_DH) vR8-8.6	A3406

3 ASSUMPTIONS AND CLARIFICATION OF SCOPE

Consumers of the TOE should consider assumptions about usage and environmental settings as requirements for the product's installation and its operating environment. This will ensure the proper and secure operation of the TOE.

3.1 USAGE AND ENVIRONMENTAL ASSUMPTIONS

The following assumptions are made regarding the use and deployment of the TOE:

- The OS relies upon a trustworthy computing platform for its execution. This underlying platform is out of scope of this PP.
- The user of the OS is not willfully negligent or hostile and uses the software in compliance with the applied enterprise security policy. At the same time, malicious software could act as the user, so requirements which confine malicious subjects are still in scope.
- The administrator of the OS is not careless, willfully negligent, or hostile, and administers the OS within compliance of the applied enterprise security policy

3.2 CLARIFICATION OF SCOPE

Only the functionality included in the claimed Protection Profiles listed in Section 1.1 was included in the scope of the evaluation.

Additionally, the following interfaces are not included as part of the evaluated configuration and are disabled in the evaluated configuration:

- GUI
    - A graphical user interface for system administration or any other operation is not included in the evaluated configuration.
- LSM (Linux Security Module) Support
    - The mandatory access control functionality offered by the Linux Security Module (LSM) framework found in the Linux kernel is not assessed by the evaluation and disabled in the evaluated configuration. All LSM modules such as SELinux, AppArmor, SMACK and others are not assessed as part of the evaluation. The evaluated configuration enables aspects of the LSM though.
- GSS-API Security Mechanisms
    - The GSS-API is used to secure the connection between different audit daemons. The security mechanisms used by the GSS-API, however, are disabled in the evaluated configuration

4 EVALUATED CONFIGURATION

The evaluated configuration for the TOE comprises:

TOE Software/Firmware	Oracle Linux 8.4 with the following package updates: • kernel-uek 5.4.17-2136.312.3.4.el8uek • openssl 1:1.1.1k-7.el8_6 • platform-python 3.6.8-47.0.1.el8_6 • expat 2.2.5-8.0.1.el8_6.3 • file 5.33-20.el8 • glibc 2.28-189.5.0.1.el8_6 • gnutls 3.6.16-5.el8_6 • grub2-common 2.02-123.0.10.el8_6.8 • nettle 3.4.1-7.el8 • libsolv 07.20-1.el8 • libtirpc 1.1.4-6.el8 • libxml2 2.9.7-13.el8_6.1 • lz4-libs 1.8.3-3.el8_4 • nss 3.79.0-10.el8_6 • polkit 0.115-13.0.1.el8_5.2 • sssd-common 2.6.2-4.0.2.el8_6.1 • vim-minimal 2:8.0.1763-19.0.1.el8_6.4 • bind-export-libs 32:9.11.36-3.el8_6.1 • c-ares 1.13.0-6.el8 • cpio 2.12-11.el8 • cryptsetup-libs 2.3.7-2.el8 • curl 7.61.1-22.el8_6.4 • cyrus-sasl-lib 2.1.27-6.el8_5 • dnf 4.7.0-8.0.1.el8 • libgcc 8.5.0-10.1.0.1.el8_6 • gzip 1.9-13.el8_5 • json-c 0.13.1-3.el8 • kpartx 0.8.4-22.el8_6.2 • libarchive 3.3.3-3.el8_5 • libgcrypt 1.8.5-7.el8_6 • libksba 1.3.5-8.el8_6 • lua-libs 5.3.4-12.el8 • microcode_ctl 4:20220207-1.20220510.1.0.1.el8_6 • ncurses 6.1-9.20180224.el8 • openssh 8.0p1-13.el8 • pcre 8.42-6.el8 • pcre2 10.32-3.el8_6 • rpm 4.14.3-24.el8_6 • rsyslog 8.2102.0-7.el8_6.1 • shim 15.6-1.0.3.el8 • systemd 239-58.0.1.el8.6.8 • sqlite-libs 3.26.0-16.el8_6 • udisks2 2.9.0-9.el8 • xz 5.2.4-4.el8_6 • zlib 1.2.11-19.el8_6 • NetworkManager 1:1.36.0-9.0.1.el8_6 • kexec-tools 2.0.20-68.0.3.el8 • libsepol 2.9-3.el8 • platform-python-pip 9.0.3-22.el8 • libsss_autofs 2.6.2-4.0.2.el8_6.1 • libsss_sudo 2.6.2-4.0.2.el8_6.1

	• libgomp 8.5.0-10.1.0.1.el8_6 • libssh 0.9.6.3.el8 • libstdc++ 8.5.0-10.1.0.1.el8_6 • glib2 2.56.4-158.el8_6.18 • gnupg2 2.2.20-3.el8_6	• sssd-nfs-idmap 2.6.2-4.0.2.el8_6.1 • python3-pip-wheel 9.0.3-22.el8
TOE Hardware	Hardware Platforms with the following CPUs; • AMD EPYC 7551 • Intel Skylake Xeon Platinum 8167M	

4.1 DOCUMENTATION

The following documents are provided to the consumer to assist in the configuration and installation of the TOE:

a) Oracle Linux 8.4 Common Criteria Guidance Document, Version 0.8, 12 April, 2023
b) Oracle Linux 8 Installing Oracle Linux, F13930-24, August 2022
c) Oracle Linux 8 Enhancing System Security, F22907-21, May 2022
d) Oracle Linux Connecting to Remote Systems with OpenSSH, F22963-09, June 2022
e) Oracle Linux 8 Setting Up System Users and Authentication, F21455-09, November 2022

5 EVALUATION ANALYSIS ACTIVITIES

The evaluation analysis activities involved a structured evaluation of the TOE. Documentation and process dealing with Development, Guidance Documents, and Life-Cycle Support were evaluated.

5.1 DEVELOPMENT

The evaluators analyzed the documentation provided by the vendor; they determined that the design completely and accurately describes the TOE security functionality (TSF) interfaces and how the TSF implements the security functional requirements. The evaluators determined that the initialization process is secure, that the security functions are protected against tamper and bypass, and that security domains are maintained.

5.2 GUIDANCE DOCUMENTS

The evaluators examined the TOE preparative user guidance and operational user guidance and determined that it sufficiently and unambiguously describes how to securely transform the TOE into its evaluated configuration and how to use and administer the product. The evaluators examined and tested the preparative and operational guidance and determined that they are complete and sufficiently detailed to result in a secure configuration.

Section 4.1 provides details on the guidance documents.

5.3 LIFE-CYCLE SUPPORT

An analysis of the TOE configuration management system and associated documentation was performed. The evaluators found that the TOE configuration items were clearly marked.

The evaluators examined the delivery documentation and determined that it described all the procedures required to maintain the integrity of the TOE during distribution to the consumer.

6 TESTING ACTIVITIES

Testing consists of the following three steps: assessing developer tests, performing independent tests, and performing a vulnerability analysis.

6.1 ASSESSMENT OF DEVELOPER TESTS

The evaluators verified that the developer has met their testing responsibilities by examining their test evidence, and reviewing their test results, as documented in the Evaluation Test Report (ETR). The correspondence between the tests identified in the developer's test documentation and the functional specification was complete.

6.2 CONDUCT OF TESTING

The TOE was subjected to a comprehensive suite of formally documented, independent functional and penetration tests. The detailed testing activities, including configurations, procedures, test cases, expected results and observed results are documented in a separate Test Results document.

6.3 INDEPENDENT TESTING

During this evaluation, the evaluator developed independent functional & penetration tests by examining design and guidance documentation.

All testing was planned and documented to a sufficient level of detail to allow repeatability of the testing procedures and results. The following testing activities were performed:

a. PP Assurance Activities: The evaluator performed the assurance activities listed in the claimed PP

b. Cryptographic Implementation Verification: The evaluator verified that the claimed cryptographic implementation was present in the TOE.

6.3.1 INDEPENDENT TESTING RESULTS

The developer's tests and the independent tests yielded the expected results, providing assurance that the TOE behaves as specified in its ST and functional specification.

6.4 VULNERABILITY ANALYSIS

The vulnerability analysis focused on 4 flaw hypotheses.

- Public Vulnerability based (Type 1)
- Technical community sources (Type 2)
- Evaluation team generated (Type 3)
- Tool Generated (Type 4)

The evaluators conducted an independent review of all evaluation evidence, public domain vulnerability databases and technical community sources (Type 1 & 2). Additionally, the evaluators used automated vulnerability scanning tools to discover potential network, platform, and application layer vulnerabilities (Type 4). Based upon this review, the evaluators formulated flaw hypotheses (Type 3), which they used in their vulnerability analysis.

Type 1 & 2 searches were conducted on **12 November 2022** and included the following search terms:

OpenSSL 1.1.1k	Oracle Linux 8.4	Oracle Linux UEK Kernel
OpenSSH Oracle Linux	Kernel-UEK	
OpenSSH Version 8	Kernel 5.4.17	

Vulnerability searches were conducted using the following sources:

National Vulnerability Database: https://nvd.nist.gov/vuln/search	Oracle Linux Security Errata: https://linux.oracle.com/ords/
Google: http://google.ca	

6.4.1 VULNERABILITY ANALYSIS RESULTS

The vulnerability analysis did not uncover any security relevant residual exploitable vulnerabilities in the intended operating environment.

7 RESULTS OF THE EVALUATION

The Information Technology (IT) product identified in this certification report, and its associated certificate, has been evaluated at an approved testing laboratory established under the Canadian Centre for Cyber Security. This certification report, and its associated certificate, apply only to the specific version and release of the product in its evaluated configuration.

This evaluation has provided the basis for the conformance claim documented in Table 1. The overall verdict for this evaluation is **PASS**. These results are supported by evidence in the ETR.

7.1 RECOMMENDATIONS/COMMENTS

It is recommended that all guidance outlined in Section 4.1 be followed to configure the TOE in the evaluated configuration.

8 SUPPORTING CONTENT

8.1 LIST OF ABBREVIATIONS

Term	Definition
CAVP	Cryptographic Algorithm Validation Program
CCTL	Common Criteria Testing Laboratory
CMVP	Cryptographic Module Validation Program
CSE	Communications Security Establishment
EAL	Evaluation Assurance Level
ETR	Evaluation Technical Report
IT	Information Technology
ITS	Information Technology Security
PP	Protection Profile
SFR	Security Functional Requirement
ST	Security Target
TOE	Target of Evaluation
TSF	TOE Security Function

8.2 REFERENCES

Reference
Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 5, April 2017.
Common Methodology for Information Technology Security Evaluation, CEM, Version 3.1 Revision 5, April 2017.
Evaluation Technical Report Oracle Linux 8.4, 12 April 2023, v1.2
Security Target Oracle Linux 8.4, 12 April 2023, v1.12
Assurance Activity Report Oracle Linux 8.4, 12, April 2023, v1.5