KECS-CR-19-06

PrivacyDB V2.0

Certification Report

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This document is the certification report for PrivacyDB V2.0 of OWL Systems Inc.

The Certification Body

IT Security Certification Center

The Evaluation Facility

Korea System Assurance (KOSYAS)

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1. Executive Summary

This report describes the certification result drawn by the certification body on the results of the PrivacyDB V2.0 developed by OWL Systems Inc. with reference to the Common Criteria for Information Technology Security Evaluation (“CC” hereinafter) [1]. It describes the evaluation result and its soundness and conformity.

The Target of Evaluation (“TOE” hereinafter) is database encryption software. The TOE provides a variety of security features: security audit, cryptographic operation using cryptographic module (Key# Crypto v1.3) validated under the Korea Cryptographic Module Validation Program (KCMVP), identification and authentication including mutual authentication between TOE components, security management, the TOE access session management, and the TSF protection function.

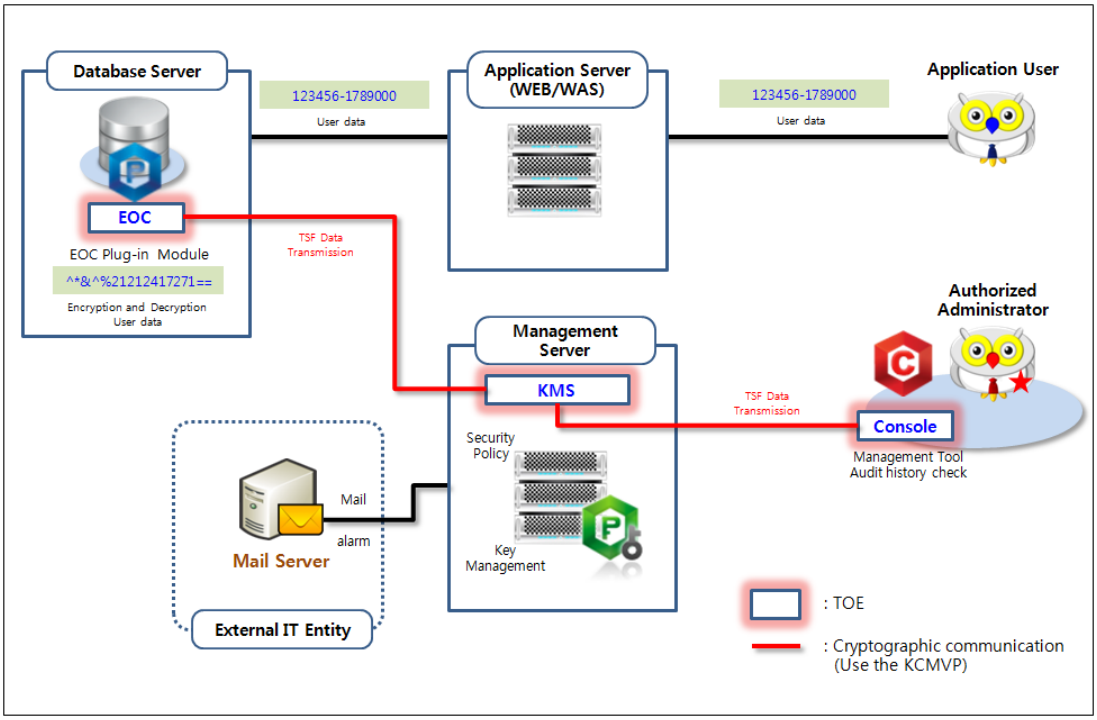
The evaluation of the TOE has been carried out by Korea System Assurance (KOSYAS) and completed on January 22, 2019. This report grounds on the Evaluation Technical Report (ETR) [6] KOSYAS had submitted and the Security Target (ST) [7].

The ST claims strict conformance to the Korean National Protection Profile for Database Encryption V1.0 [5]. All Security Assurance Requirements (SARs) in the ST are based only upon assurance component in CC Part 3, and the TOE satisfies the SARs of the PP [5]. Therefore the ST and the resulting TOE is CC Part 3 conformant. The Security Functional Requirements (SFRs) are based upon both functional components in CC Part 2 and a newly defined component in the Extended Component Definition chapter of the PP, therefor the ST, and the TOE satisfies the SFRs in the ST. Therefore, the ST and the resulting TOE is CC Part 2 extended.

[Figure 1] ~ [Figure 4] shows the operational environment of the TOE. The TOE is comprised of the KMS, Console and EOC and can be installed 'Plug-in' and 'API' type.

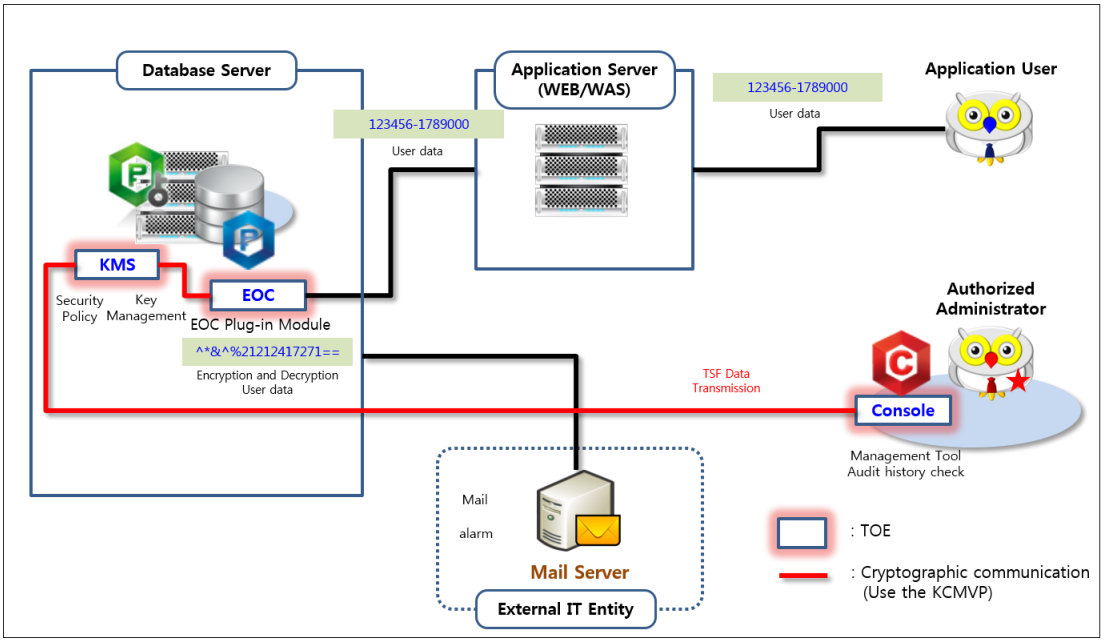
The EOC is installed within the Database Server where the protected DB resides and encrypts the user data received from the Application Server before storing it as DB in accordance with the security policy of an authorized administrator. EOC performs the decryption of encrypted user data from the Database Server to the Application Server.

The TOE was evaluated in operational environment where the DBMS for protected DB is Oracle 11g.



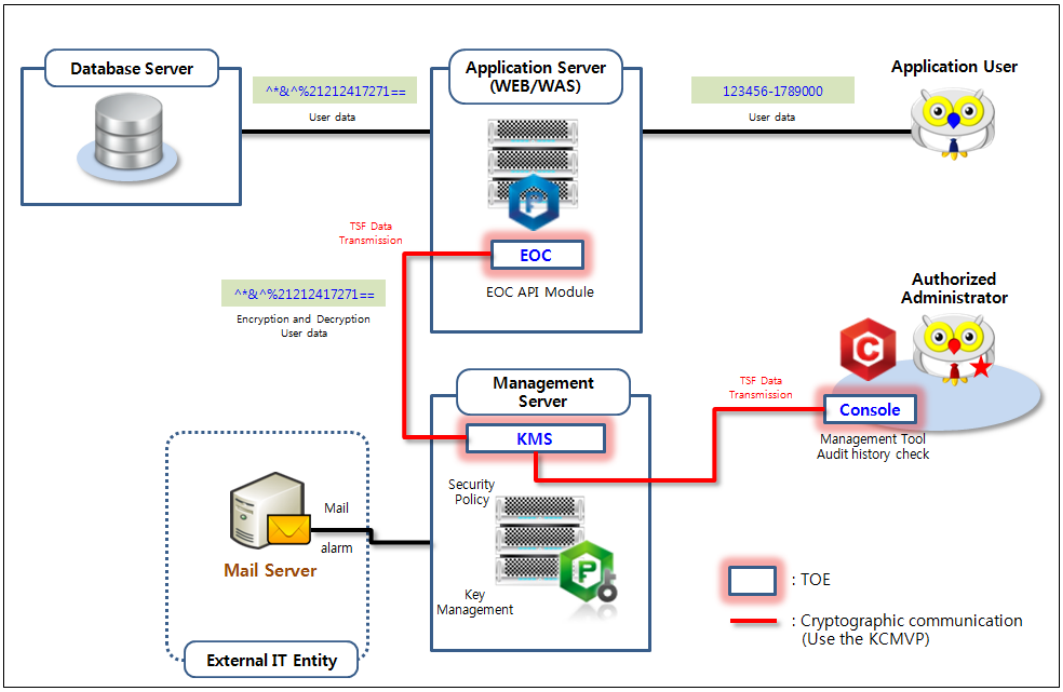
[Figure 1] Plug-in type operational environment (EOC, KMS separate type)

An authorized administrator accesses the KMS through the console to perform security management. An KMS can be installed with an EOC on a Database Server or physically separate from an EOC.

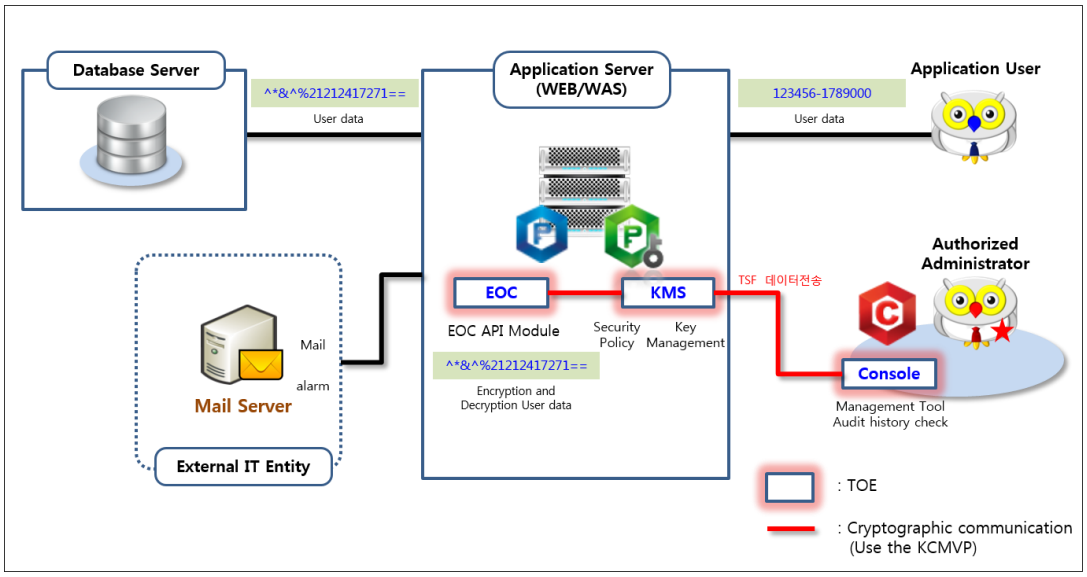


[Figure 2] Plug-in type operational environment (EOC, KMS integrated type)

[Figure-3], [Figure-4] is an API-based operating environment. Applications that are installed in Application Server and provide application services are developed using the API provided by the EOC to use the encryption and decryption function of the TOE.



[Figure 3] API-type operational environment (EOC, KMS separate type)



[Figure 4] API-type operational environment (EOC, KMS Integrated type)

As other external entities necessary for the operation of the TOE, there is email server to

send alerts by email to the authorized administrator.

necessary for installation and operation of the TOE are shown in [Table 1] and [Table 2].

TOE Component	Contents
KMS	CPU: Intel Dual core 2.4 GHz or higher Memory: 8GB Memory or higher HDD: Space required for TOE installation is 30G or higher NIC : 10/100/1000 Mb NIC * 1EA or higher
EOC	CPU: Intel Dual core 2.4 GHz or higher Memory: 8GB Memory or higher HDD: Space required for TOE installation is 30G or higher NIC : 10/100/1000 Mb NIC * 1EA or higher
Console	CPU: Intel Dual core 2.4 GHz or higher Memory: 8GB Memory or higher HDD: Space required for TOE installation is 30G or higher NIC : 10/100/1000 Mb NIC * 1EA or higher

[Table 1] Non-TOE Hardware required by the TOE

TOE Component	Contents		Notes
KMS	OS	CentOS 6.8 x86_64 (Kernel 2.6.32-504)	
	DBMS	PostgreSQL 9.5.13	Audit Storage
EOC	OS	CentOS 6.8 x86_64 (Kernel 2.6.32-504)	
	WAS	Apache-tomcat 7.0 (7.0.82), 64bit	API type
	DBMS	Oracle 11g (11.2.0.1.0) x64	Plug-in type
	JRE	jre 7u80 linux x64	
Console	OS	Windows 7 Professional (64 bit)	

[Table 2] Non-TOE Software required by the TOE

In addition, external IT entities linked to the TOE operation are as follows.

Mail Server: Send email to authorized administrator

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2. Identification

The TOE reference is identified as follows.

TOE	PrivacyDB V2.0
Version	V2.0.4.9
TOE Components	Privacy-KMS ver 2.0.4.9 Privacy-Console ver 2.0.2.17 Privacy-EOC ver 2.0.4.9
Guidance Documents	PrivacyDB V2.0 Preparative Procedures V1.8 PrivacyDB V2.0 User Operational Guidance V1.8

[Table 3] TOE identification

The TOE is delivered contained in a CD-ROM.

[Table 4] summarizes additional information for scheme, developer, sponsor, evaluation facility, certification body, etc.

Scheme	Korea Evaluation and Certification Guidelines for IT Security (August 24, 2017) Korea Evaluation and Certification Regulation for IT Security (September 12, 2017)
TOE	PrivacyDB V2.0
Common Criteria	Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 5, CCMB-2017-04-001 ~ CCMB-2017-04-003, April 2017
Protection Profile	Korean National Protection Profile for Database Encryption V1.0, KECS-PP-0820-2017, August 18, 2017
Developer	OWL Systems Inc.
Sponsor	OWL Systems Inc.
Evaluation Facility	Korea System Assurance (KOSYAS)
Completion Date of Evaluation	January 22, 2019
Certification Body	IT Security Certification Center

[Table 4] Additional identification information

3. Security Policy

The TOE complies security policies defined in the ST [7] by security requirements.

Thus the TOE provides following security features. For more details refer to the ST [7].

TSF	Explanation
Security Audit	The security audit function consists of generating audit records, inquiring audit records, analyzing and responding to security violations, and protecting audit records.
Cryptographic Support	The TOE supports cryptographic key management, cryptographic operation, and random bit generation.
User Data Protection	The TOE provides users with column-by-column encryption and decryption of user data. To protect user data stored within the protected DBMS, encrypt and store the data using the cryptographic module validated under the Korea Cryptographic Module Validation Program (KCMVP).
Identification and Authentication	The TOE identifies and authenticates administrators with ID and PW.
Security Management	Only authorized administrators can perform security management functions such as setting security functions, setting security policies, and generating encryption keys.
Protection of the TSF	To protect TSF data transmitted between TOE components encryption communication is carried out. The TOE performs self-test on the main process at startup or periodically during operation.
TOE Access	The TOE allows a management connection session that attempted to access the terminal specified by the accessible IP, provides the ability to end a session if an authorized administrator has not been active for a period of time since logging in.

[Table 5] The TOE Security Functions

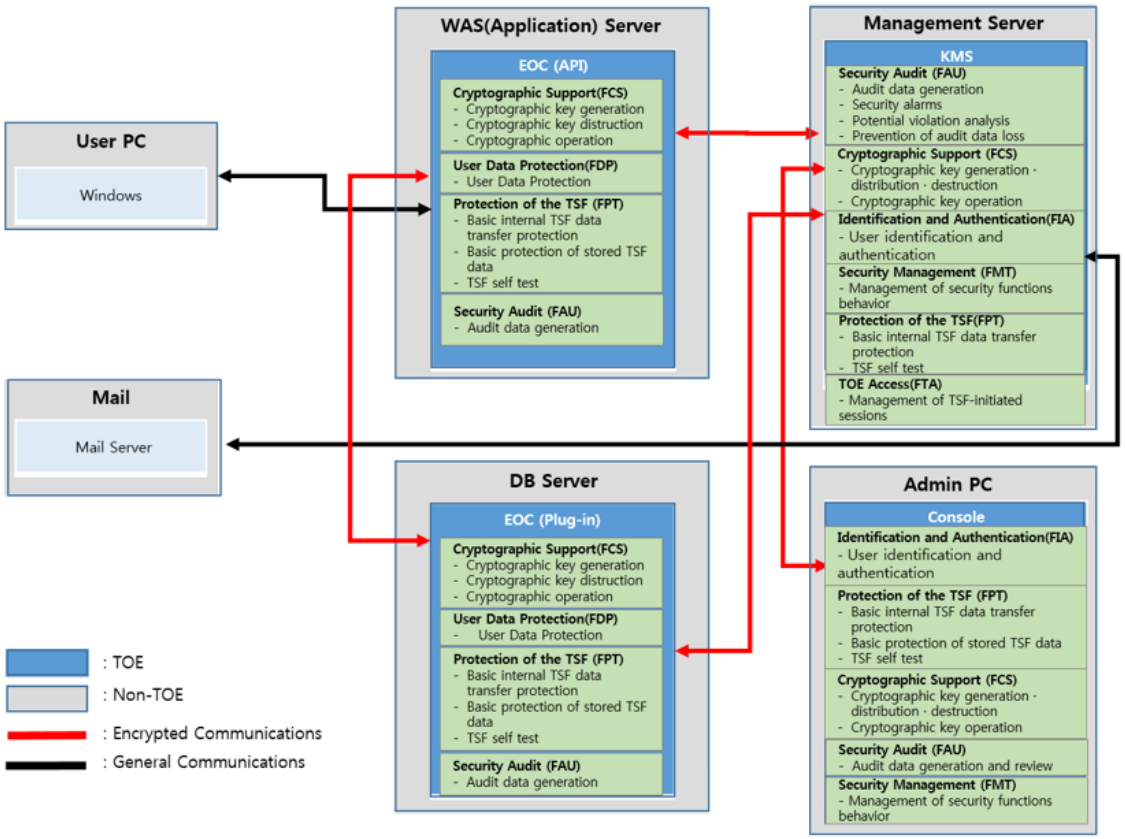
4. Assumptions and Clarification of Scope

There is no explicit security problem definition chapter, therefore, no assumptions section, in the low assurance ST. Some Security aspects of the operational environment are added to those of the PP in which the TOE will be used or is intended to be used (For the detailed and precise definition of the security objectives of the operational environment, refer to the ST, chapter 3)

5. Architectural Information

The physical scope of the TOE consists of the KMS, Console, EOC and guidance. The following security functions are provided by the TOE Logical scope and boundary of

TOE is shown in [Figure 2]



[Figure 5] TOE Logical scope

6. Documentation

The following documentation is evaluated and provided with the TOE by the developer to the customer.

Identifier	Version	Date
PrivacyDB V2.0 Preparative Procedures - PrivacyDB V2.0 Preparative Procedures V1.8.pdf	V1.8	December 19, 2018
PrivacyDB V2.0 Operational Guidance - PrivacyDB V2.0 Operational Guidance V1.8.pdf	V1.8	December 19, 2018

[Table 6] Documentation

7. TOE Testing

The developer took a testing approach based on the security services provided by each TOE component based on the operational environment of the TOE. Each test case includes the following information:

- Test no : Identifier of each test case
- Test Purpose: Includes the security functions and modules to be tested
- Test Configuration: Details about the test configuration
- Test Procedure detail: Detailed procedures for testing each security function
- Expected result: Result expected from testing
- Actual result: Result obtained by performing testing
- Test result compared to the expected result: Comparison between the expected and actual result

The developer correctly performed and documented the tests according to the assurance component ATE_FUN.1.

The evaluator has installed the product using the same evaluation configuration and tools as the developer's test and performed all tests provided by the developer. The evaluator has confirmed that, for all tests, the expected results had been consistent with the actual results. In addition, the evaluator conducted penetration testing based upon test cases devised by the evaluator resulting from the independent search for potential vulnerabilities. The evaluator testing effort, the testing approach, configuration, depth, and results are summarized in the ETR [6].

8. Evaluated Configuration

The TOE is software consisting of the following components:

TOE: PrivacyDB V2.0 (V2.0.4.9)

- Privacy-KMS ver 2.0.4.9
- Privacy-Console ver 2.0.2.17
- Privacy-EOC ver 2.0.4.9

The Administrator can identify the complete TOE reference after installation using the product's Info check menu. And the guidance documents listed in this report chapter 6, [Table 6] were evaluated with the TOE

9. Results of the Evaluation

The evaluation facility provided the evaluation result in the ETR [6] which references Single Evaluation Reports for each assurance requirement and Observation Reports.
The evaluation result was based on the CC [1] and CEM [2].
As a result of the evaluation, the verdict PASS is assigned to all assurance components

9.1 Security Target Evaluation (ASE)

The ST Introduction correctly identifies the ST and the TOE, and describes the TOE in a narrative way at three levels of abstraction (TOE reference, TOE overview and TOE description), and these three descriptions are consistent with each other. Therefore, the verdict PASS is assigned to ASE_INT.1.
The Conformance Claim properly describes how the ST and the TOE conform to the CC and how the ST conforms to PPs and packages. Therefore, the verdict PASS is assigned to ASE_CCL.1.
The Security Objectives for the operational environment are clearly defined. Therefore, the verdict PASS is assigned to ASE_OBJ.1.
The Extended Components Definition has been clearly and unambiguously defined, and it is necessary. Therefore, the verdict PASS is assigned to ASE_ECD.1.
The Security Requirements is defined clearly and unambiguously, and they are internally consistent. Therefore, the verdict PASS is assigned to ASE_REQ.1.
The TOE Summary Specification addresses all SFRs, and it is consistent with other narrative descriptions of the TOE. Therefore, the verdict PASS is assigned to ASE_TSS.1.
Thus, the ST is sound and internally consistent, and suitable to be used as the basis for the TOE evaluation.
The verdict PASS is assigned to the assurance class ASE.

9.2 Life Cycle Support Evaluation (ALC)

The developer has clearly identified the TOE. Therefore, the verdict PASS is assigned to ALC_CMC.1.
The configuration management document verifies that the configuration list includes the TOE and the evaluation evidence. Therefore, the verdict PASS is assigned to ALC_CMS.1.
Also the evaluator confirmed that the correct version of the software is installed in

device.

The verdict PASS is assigned to the assurance class ALC.

9.3 Guidance Documents Evaluation (AGD)

The procedures and steps for the secure preparation of the TOE have been documented and result in a secure configuration. Therefore, the verdict PASS is assigned to AGD_PRE.1.

The operational user guidance describes for each user role the security functionality and interfaces provided by the TSF, provides instructions and guidelines for the secure use of the TOE, addresses secure procedures for all modes of operation, facilitates prevention and detection of insecure TOE states, or it is misleading or unreasonable. Therefore, the verdict PASS is assigned to AGD_OPE.1.

Thus, the guidance documents are adequately describing the user can handle the TOE in a secure manner. The guidance documents take into account the various types of users (e.g. those who accept, install, administrate or operate the TOE) whose incorrect actions could adversely affect the security of the TOE or of their own data.

The verdict PASS is assigned to the assurance class AGD.

9.4 Development Evaluation (ADV)

The functional specifications specify a high-level description of the SFR-enforcing and SFR-supporting TSFIs, in terms of descriptions of their parameters. Therefore, the verdict PASS is assigned to ADV_FSP.1.

The verdict PASS is assigned to the assurance class ADV.

9.5 Test Evaluation (ATE)

The developer correctly performed and documented the tests in the test documentation. Therefore, the verdict PASS is assigned to ATE_FUN.1.

By independently testing a subset of the TSFI, the evaluator confirmed that the TOE behaves as specified in the functional specification and guidance documentation. Therefore, the verdict PASS is assigned to ATE_IND.1.

Thus, the TOE behaves as described in the ST and as specified in the evaluation evidence (described in the ADV class).

The verdict PASS is assigned to the assurance class ATE.

9.6 Vulnerability Assessment (AVA)

By penetrating testing, the evaluator confirmed that there are no exploitable vulnerabilities by attackers possessing basic attack potential in the operational environment of the TOE. Therefore, the verdict PASS is assigned to AVA_VAN.1.

Thus, potential vulnerabilities identified, during the evaluation of the development and anticipated operation of the TOE or by other methods (e.g. by flaw hypotheses), don't allow attackers possessing basic attack potential to violate the SFRs.

The verdict PASS is assigned to the assurance class AVA.

9.7 Evaluation Result Summary

Assurance Class	Assurance Component	Evaluator Action Elements	Verdict		
			Evaluator Action Elements	Assurance Component	Assurance Class
ASE	ASE_INT.1	ASE_INT.1.1E	PASS	PASS	PASS
		ASE_INT.1.2E	PASS		
	ASE_CCL.1	ASE_CCL.1.1E	PASS	PASS	
	ASE_OBJ.1	ASE_OBJ.1.1E	PASS	PASS	
	ASE_ECD.1	ASE_ECD.1.1E	PASS	PASS	
		ASE_ECD.1.2E	PASS		
	ASE_REQ.1	ASE_REQ.1.1E	PASS	PASS	
	ASE_TSS.1	ASE_TSS.1.1E	PASS	PASS	
		ASE_TSS.1.2E	PASS		
ALC	ALC_CMS.1	ALC_CMS.1.1E	PASS	PASS	PASS
	ALC_CMC.1	ALC_CMC.1.1E	PASS	PASS	
AGD	AGD_PRE.1	AGD_PRE.1.1E	PASS	PASS	PASS
		AGD_PRE.1.2E	PASS	PASS	
	AGD_OPE.1	AGD_OPE.1.1E	PASS	PASS	
ADV	ADV_FSP.1	ADV_FSP.1.1E	PASS	PASS	PASS
		ADV_FSP.1.2E	PASS	PASS	
ATE	ATE_FUN.1	ATE_FUN.1.1E	PASS	PASS	PASS
	ATE_IND.1	ATE_IND.1.1E	PASS	PASS	
		ATE_IND.1.2E	PASS		
AVA	AVA_VAN.1	AVA_VAN.1.1E	PASS	PASS	PASS
		AVA_VAN.1.2E	PASS		
		AVA_VAN.1.3E	PASS		

[Table 7] Evaluation Result Summary

10. Recommendations

The TOE security functionality can be ensured only in the evaluated TOE operational environment with the evaluated TOE configuration, thus the TOE shall be operated by complying with the followings:

- The TOE must be installed and operated in a physically secure environment accessible only by authorized administrators and should not allow remote management from outside.
- The administrator shall maintain a safe state such as application of the latest security patches, eliminating unnecessary service, change of the default ID/password, etc., of the operating system and DBMS in the TOE operation.
- The administrator should periodically check a spare space of audit data storage in case of the audit data loss, and carries out the audit data backup to prevent audit data loss.
- The developer who uses the TOE with application server and DBMS fully understands the preparation procedure and user operation manual install and operate the security function.
- The developer who uses the TOE to interoperate with the user identification and authentication function in the operational environment of the business system shall ensure that the security functions of the TOE are securely applied in accordance with the requirements of the manual provided with the TOE.

11. Security Target

PrivacyDB V2.0 Security Target V1.10 is included in this report for reference

12. Acronyms and Glossary

CC	Common Criteria
EAL	Evaluation Assurance Level
PP	Protection Profile
SAR	Security Assurance Requirement
SFR	Security Functional Requirement
ST	Security Target
TOE	Target of Evaluation
TSF	TOE Security Functionality
TSFI	TSF Interface
Approved cryptographic algorithm	A cryptographic algorithm selected by Korea Cryptographic Module Validation Authority for block cipher, secure hash algorithm, message authentication code, random bit generation, key agreement, public key cipher, digital signatures cryptographic algorithms considering safety, reliability and interoperability
Column	A set of data values of a particular simple type, one for each row of the table in a relational database
Database	A set of data that is compiled according to a certain structure in order to receive, save, and provide data in response to the demand of multiple users to support multiple application duties at the same time. The database related to encryption by column, which is required by this PP, refers to the relational database.
DBMS (Database Management System)	A software system composed to configure and apply the database. The DBMS related to encryption by column, which is required by this PP, refers to the database management system based on the relational database model.

Self-test	Pre-operational or conditional test executed by the cryptographic module

13. Bibliography

The certification body has used following documents to produce this report.

[1] Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 5, CCMB-2017-04-001 ~ CCMB-2017-04-003, April, 2017

Part 1: Introduction and general model

Part 2: Security functional components

Part 3: Security assurance components

[2] Common Methodology for Information Technology Security Evaluation, Version 3.1 Revision 5, CCMB-2017-04-004, April, 2017

[3] Korea Evaluation and Certification Guidelines for IT Security (August 24, 2017)

[4] Korea Evaluation and Certification Scheme for IT Security (September 12, 2017)

[5] Korean National Protection Profile for Database Encryption V1.0, August 18, 2017

[6] PrivacyDB V2.0 Evaluation Technical Report Lite V2.00, January 22, 2019

[7] PrivacyDB V2.0 Security Target V1.10, January 11, 2019