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Test Results for SQLite Data Recovery Tool:
Belkasoft Evidence Center v1.1.11.9199

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Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the Department of Homeland Security (DHS) Science and Technology Directorate (S&T), the National Institute of Justice, and the National Institute of Standards and Technology (NIST) Special Programs Office and Information Technology Laboratory. CFTT is supported by other organizations, including the Federal Bureau of Investigation, the U.S. Department of Defense's Cyber Crime Center, U.S. Internal Revenue Service's Criminal Investigation Division Electronic Crimes Program, as well as the DHS Bureau of Immigration and Customs Enforcement, U.S. Customs and Border Protection, and U.S. Secret Service. The objective of the CFTT program is to provide measurable assurance to practitioners, researchers, and other applicable users that the tools used in computer forensics investigations provide accurate results. Accomplishing this requires the development of specifications and test methods for computer forensics tools and subsequent testing of specific tools against those specifications.

Test results provide the information necessary for developers to improve tools, users to make informed choices, and the legal community and others to understand the tools' capabilities. The CFTT approach to testing computer forensics tools is based on well-recognized methodologies for conformance and quality testing. Interested parties in the computer forensics community can review and comment on the specifications and test methods posted on the CFTT Website (<https://www.cftt.nist.gov/>).

This document reports the results from testing Belkasoft Evidence Center v1.1.11.9199 for SQLite data recovery, including: displaying recovered SQLite database information, identifying, categorizing and reporting Write-Ahead Log (WAL), Rollback Journal data, and sequence WAL journal data.

Test results from other tools can be found on the S&T-sponsored digital forensics webpage, <https://www.dhs.gov/science-and-technology/nist-cftt-reports>.

How to Read This Report

This report is divided into four sections. Section 1 identifies and provides a summary of any significant anomalies observed in the test runs. This section is sufficient for most readers to assess the suitability of the tool for the intended use. Section 2 lists testing environment and SQLite data objects used for testing. Section 3 provides an overview of the test case results reported by the tool.

Test Results for SQLite Data Recovery

Tool Tested: Belkasoft Evidence Center

Software Version: 1.1.11.9199

Supplier: Belkasoft

Address: 702 San Conrado Terrace, Unit 1, Sunnyvale CA 94085

WWW: belkasoft.com

1 Results Summary

Belkasoft Evidence Center v1.1.11.9199 was tested for its ability to report recovered SQLite database information. Except for the following anomalies, the tool was able to report and recover all supported data objects completely and accurately.

Header related information:

The page size, number of pages, encoding, and journal type are not reported within the SQLite viewer.

Deleted and modified row metadata:

- The status of records that have been deleted or modified are not specified by the tool as “deleted” or “modified” records.
- The recovered row and table name are not reported for deleted records that have been recovered.

Schema data reporting:

The type (i.e., Primary Key, Int, Float, Text, BLOB) of individual items within a record are not reported.

Binary Large Object (BLOB) data:

Binary Large Object (BLOB) data containing graphic files are not displayed.

For more test result details see section 2.

2 Testing Environment

The tests were run in the National Institute of Standards and Technology (NIST) CFTT lab. This section describes the selected test execution environment, and the data objects populated for SQLite data recovery.

2.1 Execution Environment

Belkasoft Evidence Center v1.1.11.9199 was installed on Windows 10 Pro version 10.0.18363.418.

2.2 SQLite Data

Belkasoft Evidence Center v1.1.11.9199 was measured by its ability to report recovered SQLite database information. SQLite versions 3.19.0 (Android) and 3.32.3 iPhone Operating System (iOS) were used when creating the SQLite databases. These versions are the most current versions running on Android and iOS. Table 2 below defines the SQLite data tested per each test case.

Test Case	Data
SQLite Forensic Tool (SFT)-01: SQLite header parsing	<i>Page Size (4096, 1024, 8192)</i> <i>Journal Mode Information (Write-Ahead Log (WAL), PERSIST, OFF)</i> <i>Number of Pages</i> <i>UTF(Unicode Transformation Format)-8</i> <i>UTF-16 (Little Endian) LE</i> <i>UTF-16 (Big Endian) BE</i>
SFT-02: SQLite Schema Reporting	<i>Table Names</i> <i>Column Names per Table</i> <i>Row Information per Table</i>
SFT-03: SQLite Recoverable Rows	<i>Source filename</i> <i>Row Status: Deleted</i> <i>Row Status: Modified</i>
SFT-04: SQLite Data Element Metadata	<i>Source filename</i> <i>Row Status: Deleted</i> <i>Row Status: Modified</i>
SFT-05: SQLite Schema Data Reporting	<i>Primary Key</i> <i>Integer (Int)</i> <i>Float</i> <i>Text</i> <i>Binary Large Object (BLOB) (bmp, gif, heic, jpg, pdf, png, tiff)</i> <i>Boolean</i>
SFT-06: Recovered Row Metadata	<i>Source Filename</i> <i>Row Status: Deleted</i> <i>Row Status: Modified</i>
	<i>File Offset, length</i>

Test Case	Data
SFT-07: SQLite Recovered Data Information	<i>Table name associated with Row</i>

Table 1: SQLite Data Objects

3 Test Results

This section provides the test case results reported by the tool. Section 3.1 identifies the PRAGMA journal mode (i.e., WAL, PERSIST, OFF), test cases, and associated data checked within individual test cases.

Belkasoft Evidence Center v1.1.11.9199 was tested for its ability to report recovered SQLite database information.

The *Test Cases* columns in sections 3.1 are comprised of two sub-columns that define a particular test category and individual sub-categories that are verified when testing. The results are as follows:

As Expected: the SQLite data recovery tool returned expected test results.

Partial: the SQLite data recovery tool returned some of the data.

Not As Expected: the SQLite data recovery tool failed to return expected test results.

Not Applicable (NA): the tool does not provide support, or the test assertion is optional.

3.1 SQLite Data Recovery

SQLite data recovery was tested with Belkasoft Evidence Center v1.1.11.9199.

All test cases were successful with the exception of the following.

- Header related information (i.e., Page Size, Journal mode information, Number of Pages, and Encoding) are not presented in the SQLite viewer.
- The status of records that have been deleted or modified are not specified by the tool as “deleted” or “modified” records.
- The type (i.e., Primary Key, Int, Float, Text, BLOB) of individual items within a record are not reported.
- Binary Large Object (BLOB) data containing graphic files are not displayed.
- The recovered row and table name are not reported for deleted records that have been recovered.

See Table 2 below for more details.

Belkasoft Evidence Center v1.1.11.9199

Test Cases – SQLite Data Recovery		<i>PRAGMA Journal Mode</i>		
		WAL	PERSIST	OFF
SFT-01: Header Parsing	Page Size	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Journal Mode Info	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Number of Pages	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	UTF-8	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	UTF-16LE	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	UTF-16BE	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Hash Value (MD5, SHA)	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SFT-02: Schema Reporting	Table Name	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Column Name	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Number of Rows	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SFT-03: Recoverable Rows	Deleted	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Modified	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SFT-04: Data Element Metadata Reporting (Source filename)	Deleted	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Modified	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
SFT-05: Schema Data Reporting	Primary Key	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Int	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Float	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Text	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	BLOB Data: .bmp	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>

Belkasoft Evidence Center v1.1.11.9199				
Test Cases – SQLite Data Recovery		PRAGMA Journal Mode		
		WAL	PERSIST	OFF
	BLOB data: .gif	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	BLOB Data: .heic	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	BLOB data: .jpg	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	BLOB data: .pdf	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	BLOB data: .png	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Boolean	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
SFT-06: Recovered Row Metadata	Source Filename	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Status: Modified	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Status: Deleted	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SFT-07: Recovered Data Info	File offset	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Recovered Row - Table Name	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>

Table 2: SQLite Data Recovery