Software Requirements Specification (SRS)

Introduction

This Software Requirements Specification (SRS) document outlines the functional and non-functional requirements for the **TestStatisticReadWrite** tool. The document maps client requirements to developer requirements and details the corresponding tests to ensure comprehensive coverage and validation.

Client Requirements Extracted from PDF

1. Functional Requirements (C-FR)

1. **C-FR1:** Process a CSV file containing test case information.
2. **C-FR2:** Read specific columns from the input CSV:
   - Test case, in format `<requirement>\<test case name>`
   - Duration, e.g., "5.4 sec", "2 min 48 sec" (time format)
   - Status, e.g., Passed, Failed
3. **C-FR3:** Accept input arguments for CSV paths and the number of test cases `<X>`:
   - Path to given CSV
   - Path to folder containing the new CSV
   - Number of test cases `<X>`
4. **C-FR4:** Print test case statistics and details to the command window:
   - Number of test cases
   - Number of passed, failed, etc., test cases
   - Test case names and their runtime of the top `<X>` most long-lasting test cases
   - Total runtime
5. **C-FR5:** Write a new CSV file with the following columns sorted by runtime:
   - Requirement
   - Test case name
   - Status
   - Runtime (in seconds, plain number with no time format)
6. **C-FR6:** Convert runtime from time format to seconds in the new CSV file.

2. Non-Functional Requirements (C-NFR)

1. **C-NFR1:** Implement the class TestStatisticReadWrite in a way that it can be delivered to a real customer.

Each client requirement **C-X** is mapped to a corresponding developer requirement **D-Y**, ensuring that the client requirement is expressed in a manner that is both measurable and testable, facilitating effective development and validation. A client requirement is considered **"Complete"** if all the corresponding developer requirements are marked as **"Complete."** The developer requirements are detailed in the following tables. Otherwise, the requirement is marked as **"In Progress."**

Mapping of Client Requirements to Developer Requirements

Client Requirement	Requirement Description	Developer Requirement	Status
C-FR1	Process a CSV file containing test case information.	D-1, D-2, D-3, D-4, D-5, D-6, D-7, D-8, D-9	Complete
C-FR2	Read specific columns from the input CSV: - Test case, in format `<requirement>\<test case name>` - Duration, e.g., "5.4 sec", "2 min 48 sec" (time format) - Status, e.g., Passed, Failed	D-3, D-5, D-6, D-7	Complete
C-FR3	Accept input arguments for CSV paths and the number of test cases `<X>` : - Path to given CSV - Path to folder containing the new CSV - Number of test cases `<X>`	D-10, D-11, D-12	Complete
C-FR4	Print test case statistics and details to the command window: - Number of test cases - Number of passed, failed, etc., test cases - Test case names and their runtime of the	D-13, D-14, D-15, D-16, D-17, D-18	Complete

Client Requirement	Requirement Description	Developer Requirement	Status
	top <X> most long-lasting test cases - Total runtime		
C-FR5	Write a new CSV file with the following columns sorted by runtime: - Requirement - Test case name - Status - Runtime (in seconds, plain number with no time format)	D-4, D-8, D-19, D-20	Complete
C-FR6	Convert runtime from time format to seconds in the new CSV file.	D-6, D-19	Complete
C-NFR1	Implement the class TestStatisticReadWrite in a way that it can be delivered to a real customer.	D-21, D-22, D-23, D-24, D-25, D-26, D-27	Complete

Developer Requirements

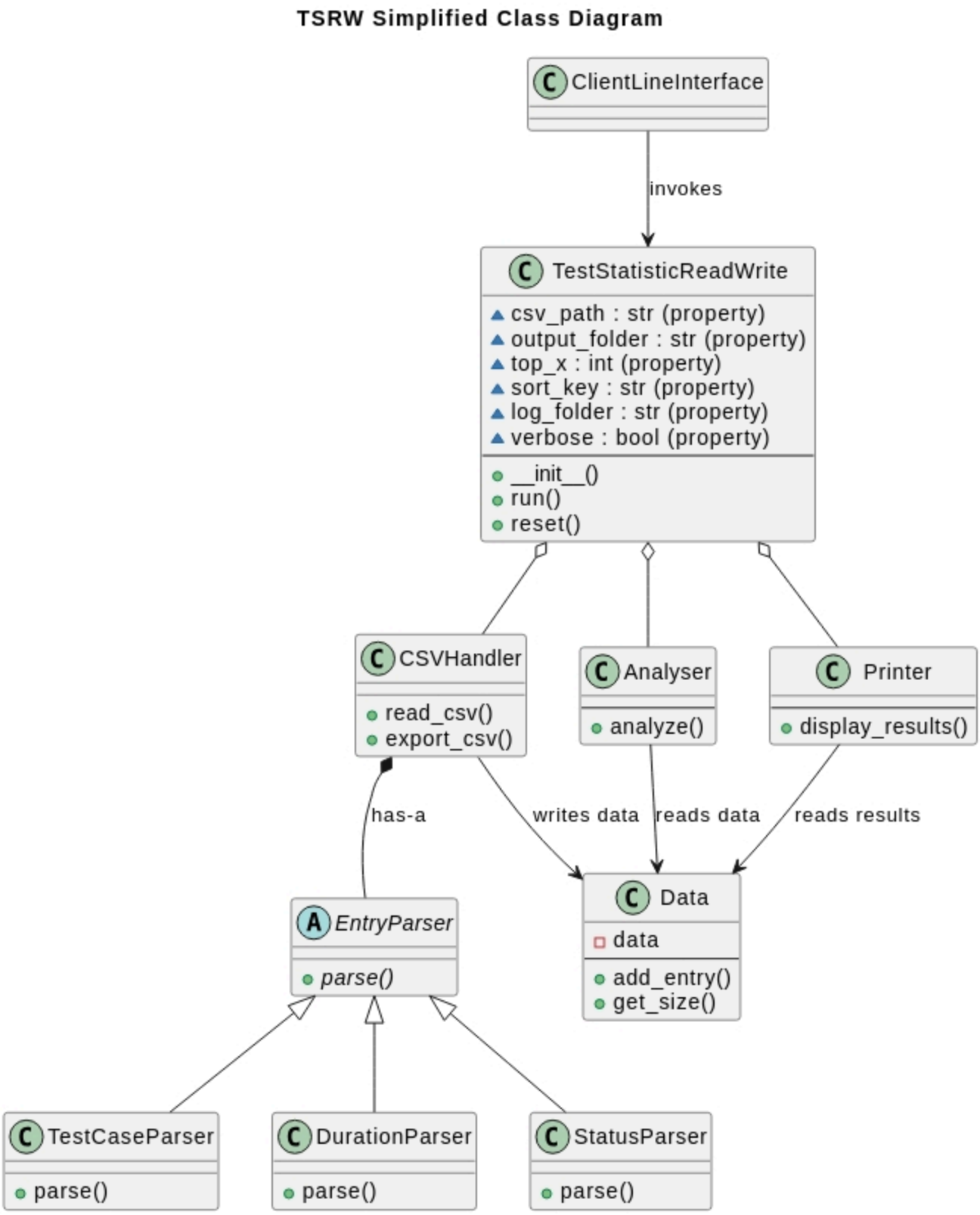
Developer Requirement	Description
D-1	The program must be able to read data from a CSV file.
D-2	It must be verified that the specified CSV file exists.
D-3	The header of the CSV file must be validated to ensure it matches expected format and structure.
D-4	Parsed data from the CSV must be stored in a structured format for further processing.
D-5	Test case name and requirement must be extracted from the corresponding column in the CSV file.
D-6	Durations provided in the CSV must be converted from various time formats into seconds.

Developer Requirement	Description
D-7	Test status information must be extracted from the CSV and validated.
D-8	The program must handle and log any lines in the CSV that do not conform to the expected format.
D-9	Valid entries must be stored in a structured format, with sorted indexes for key fields ("Requirement", "Test Case", "Duration", and "Status"), and invalid lines must be tracked.
D-10	The program must accept the path to the input CSV file as an argument.
D-11	The program must accept the path to the output folder as an argument.
D-12	The program must accept the number of top test cases (`<X>`) to process as an argument, with a default value of 10.
D-13	The total runtime of all test cases must be calculated.
D-14	The program must identify and sort the top `<X>` longest-running test cases.
D-15	The total number of test cases must be calculated and displayed.
D-16	The number of test cases for each status (e.g., Passed, Failed) must be counted.
D-17	The program must display the count of test cases for each status (e.g., Passed, Failed).
D-18	The names and runtimes of the top `<X>` longest-running test cases must be displayed.
D-19	A new CSV file must be created with the columns "Requirement", "Test Case", "Status", and "Runtime" (in seconds).
D-20	The new CSV file must be sorted by the "Duration" column in ascending order, or another specified key.
D-21	The program must be fully covered by comprehensive tests.
D-22	Errors and exceptions must be handled gracefully, with informative error messages provided to the user.
D-23	Errors, warnings, and informational messages must be logged.

Developer Requirement	Description
D-24	Logs must have an option to be written to a file.
D-25	Logging must be implemented using a Singleton design pattern.
D-26	Logs must support a verbose mode, outputting messages to the console.
D-27	The results must be displayed in either a formatted or plain-text view, as per user preference.

Mapping of Developer Requirements to Corresponding Tests

The diagram below provides a simplified and reduced overview of the developed system.



The class **TestStatisticReadWrite** can be invoked either directly in developer mode or through a command-line interface. **TestStatisticReadWrite** serves as an orchestrator, delegating responsibilities to various modules and enabling a modular and extensible design.

Data parsing operations are managed by the **EntryParser** classes. The **CSVHandler** utilizes these parsers to read the provided CSV file and stores the processed data in a **Data** object. Once the data is

stored, the orchestrator passes it to the **Analyzer**, which performs statistical analysis, calculates counts, and more. After the analysis is complete, the results are displayed by the **Printer**.

Detailed information and class diagrams can be found in the `docs` directory of the project repository.

This architecture allows the developer requirements to be reformulated with a greater focus on implementation details. The table below presents the developer requirements framed within the context of the chosen architecture. A developer requirement is considered **"Complete"** if all the corresponding tests have a status of **"Pass."** Otherwise, the requirement status is **"In Progress."** The corresponding tests are detailed in the following table.

Developer Requirement	Description	Tests	Status
D-1	The CSVHandler class shall be able to read data from a CSV file.	D-T-CSV-RDC-001, D-T-CSV-RDC-002, D-T-CSV-RDC-003, D-T-CSV-RDC-004, D-T-CSV-RDC-005, D-T-CSV-RDC-006, D-T-CSV-RDC-007, D-T-CSV-RDC-008, D-T-CSV-RDC-009, D-T-CSV-RDC-010, D-T-CSV-RDC-011	Complete
D-2	The CSVHandler class shall raise an InputFileNotFound exception if the specified CSV file does not exist.	D-T-CSV-RDC-002	Complete
D-3	The CSVHandler class shall validate the header of the CSV file:	D-T-CSV-RDC-001, D-T-CSV-RDC-004, D-T-CSV-RDC-005, D-T-CSV-RDC-006, D-T-CSV-RDC-007, D-T-CSV-RDC-008, D-T-CSV-RDC-009, D-T-CSV-RDC-010, D-T-CSV-RDC-011	Complete
D-4	The CSVHandler class shall store the parsed data in a Data object.	D-T-CSV-RDC-001, D-T-CSV-RDC-008, D-T-CSV-RDC-009, D-T-CSV-RDC-010, D-T-CSV-RDC-011, D-T-	Complete

Developer Requirement	Description	Tests	Status
		DAT-AEW-001, D-T-DAT-AME-001, D-T-DAT-ASE-001	
D-5	The TestCaseParser class shall parse the "Test case" column, extracting the requirement and test case name.	D-T-PAR-TCE-001, D-T-PAR-TCI-001, D-T-PAR-TCV-001, D-T-PAR-TCV-002	Complete
D-6	The DurationParser class shall parse the "Duration" column, converting the time format into seconds.	D-T-PAR-DPV-001, D-T-PAR-DPV-002	Complete
D-7	The StatusParser class shall parse the "Status" column.	D-T-PAR-SPE-001, D-T-PAR-SPS-001, D-T-PAR-SPV-001	Complete
D-8	The CSVHandler class shall skip and log lines that do not conform to the expected format:	D-T-CSV-LRV-001	Complete
D-9	The Data class shall store valid entries, maintain sorted indexes for each field ("Requirement", "Test Case", "Duration", and "Status"), and track invalid lines.	D-T-DAT-AEW-001, D-T-DAT-AME-001, D-T-DAT-ASE-001, D-T-PAR-DPV-001, D-T-PAR-DPV-002, D-T-PAR-SPE-001, D-T-PAR-SPS-001, D-T-PAR-SPV-001, D-T-PAR-TCE-001, D-T-PAR-TCI-001, D-T-PAR-TCV-001, D-T-PAR-TCV-002	Complete
D-10	The TestStatisticReadWrite class shall accept the path to the input CSV file as an argument.	D-T-CLI-ARG-001, D-T-CLI-CSK-001	Complete
D-11	The TestStatisticReadWrite class shall accept the path to the output folder as an argument.	D-T-ORC-OFC-001	Complete
D-12	The TestStatisticReadWrite class shall accept the number of	D-T-CLI-ACX-001, D-T-CLI-DEX-001, D-T-CLI-IXA-001,	Complete

Developer Requirement	Description	Tests	Status
	top test cases (<X>) as an argument (defaulting to 10).	D-T-CLI-IXN-001	
D-13	The Analyser class shall calculate the total runtime of all test cases.	D-T-AN-AN-001, D-T-AN-GDU-001	Complete
D-14	The Analyser class shall determine the top <X> longest-running test cases.	D-T-AN-AN-001, D-T-AN-GTX-001, D-T-AN-GTX-002, D-T-AN-GTX-003, D-T-AN-GTX-004	Complete
D-15	The Printer class shall print the total number of test cases.	D-T-PRI-DRF-001, D-T-PRI-DRN-001, D-T-PRI-DRN-002	Complete
D-16	The Data class shall count the number of test cases for each status.	D-T-DAT-CSC-001	Complete
D-17	The Printer class shall print the number of test cases for each status (Passed, Failed, etc.).	D-T-PRI-DRF-001, D-T-PRI-DRN-001, D-T-PRI-DRN-002	Complete
D-18	The Printer class shall print the test case names and runtimes of the top <X> longest-running test cases.	D-T-PRI-DRF-001, D-T-PRI-DRN-001, D-T-PRI-DRN-002, D-T-PRI-GWD-001, D-T-PRI-GWE-001, D-T-PRI-GWL-001	Complete
D-19	The CSVHandler class shall write a new CSV file with the columns "Requirement", "Test Case", "Status", and "Runtime" (in seconds).	D-T-CSV-EXC-001, D-T-CSV-EXC-003	Complete
D-20	The CSVHandler class shall sort the output CSV file by the "Duration" column in ascending order or by another key.	D-T-CLI-CSK-001, D-T-CSV-EXC-001, D-T-CSV-EXC-003	Complete

Developer Requirement	Description	Tests	Status
D-21	The TestStatisticReadWrite shall have comprehensive test coverage.	All tests with the "D-T-" prefix.	Complete
D-22	The TestStatisticReadWrite class shall handle exceptions gracefully and provide informative error messages to the user.	D-T-CLI-FRE-001, D-T-CLI-IXA-001, D-T-CLI-IXN-001, D-T-CLI-UEX-002, D-T-CSV-EXC-003, D-T-CSV-RDC-002, D-T-CSV-RDC-003, D-T-CSV-RDC-004, D-T-CSV-RDC-005, D-T-CSV-RDC-006, D-T-CSV-RDC-007, D-T-ORC-LFC-001, D-T-ORC-OFC-001, D-T-ORC-RFE-001, D-T-ORC-RFE-002, D-T-ORC-RUE-001	Complete
D-23	The Logger class shall log errors, warnings, and informational messages.	D-T-CLI-LES-001, D-T-CSV-LRV-001, D-T-LOG-EMS-001, D-T-LOG-ERR-001, D-T-LOG-INF-001, D-T-LOG-SLF-001, D-T-LOG-SLU-001, D-T-LOG-SPC-001, D-T-LOG-SVD-001, D-T-LOG-SVE-001, D-T-LOG-WAR-001, D-T-ORC-RUE-001	Complete
D-24	The Logger class shall have option to write logs to a file.	D-T-CLI-FRE-001, D-T-CLI-SSV-001, D-T-LOG-SLF-001, D-T-LOG-SLU-001, D-T-ORC-LFC-001	Complete
D-25	The Logger class shall be a Singleton.	D-T-LOG-SIN-001	Complete

Developer Requirement	Description	Tests	Status
D-26	The Logger class shall have option to enable verbose mode, which outputs logs to the console.	D-T-CLI-SSN-001, D-T-CLI-SSV-001, D-T-LOG-SVD-001, D-T-LOG-SVE-001	Complete
D-27	The Printer shall have an option to display the results in formatted or plain text way.	D-T-PRI-DAO-001, D-T-PRI-DBO-001	Complete

Test Cases Matrix

The Test Cases Matrix contains brief descriptions of the tests. Detailed test specifications and implementations can be found in the `"docs/test_specs"` directory of the project repository. A detailed description of the Test ID structure can be found in the Appendix.

Test ID	Description	Status
D-T-AN-AN-001	Assess the overall analysis functionality to ensure accurate calculations and selections.	Pass
D-T-AN-AN-002	Ensure the analysis method appropriately handles invalid input values.	Pass
D-T-AN-GDU-001	Verify that the total duration of all test cases is calculated correctly.	Pass
D-T-AN-GTX-001	Check if the program accurately retrieves the top X longest-running tests.	Pass
D-T-AN-GTX-002	Confirm that requesting top X tests from an empty dataset returns an empty list.	Pass
D-T-AN-GTX-003	Ensure that requesting more tests than available returns all tests sorted by duration.	Pass
D-T-AN-GTX-004	Validate that requesting zero top tests results in an empty list.	Pass

Test ID	Description	Status
D-T-CLI-ACX-001	Verify that the CLI correctly handles and uses a custom value.	Pass
D-T-CLI-ARG-001	Ensure that the CLI handles missing required command-line arguments properly.	Pass
D-T-CLI-CSK-001	Verify that a custom sort key provided via the command line is handled correctly.	Pass
D-T-CLI-DEX-001	Verify that the CLI correctly defaults the value to 10.	Pass
D-T-CLI-FRE-001	Ensure that user-friendly exceptions are handled correctly in the CLI.	Pass
D-T-CLI-IXA-001	Verify that the CLI handles invalid non-integer values for .	Pass
D-T-CLI-IXN-001	Verify that the CLI handles negative integer values for .	Pass
D-T-CLI-LES-001	Confirm that the end of session is properly logged by the CLI.	Pass
D-T-CLI-SSN-001	Verify successful execution of the CLI with valid input without verbose logging.	Pass
D-T-CLI-SSV-001	Verify successful execution with verbose logging enabled and a specified log folder.	Pass
D-T-CLI-UEX-002	Ensure that unexpected exceptions during CLI execution are handled appropriately.	Pass

Test ID	Description	Status
D-T-CSV-EXC-001	Test exporting data to a CSV file with valid data and sorting.	Pass
D-T-CSV-EXC-003	Verify that a CSVExportError is raised when a file write error occurs during CSV export.	Pass

Test ID	Description	Status
D-T-CSV-LRV-001	Ensure that skipped lines due to errors are correctly logged and reported.	Pass
D-T-CSV-RDC-001	Confirm the program can successfully read and parse data from a valid CSV file.	Pass
D-T-CSV-RDC-002	Ensure that an InputFileNotFound exception is raised when attempting to read a non-existent file.	Pass
D-T-CSV-RDC-003	Verify that an EmptyFileError is raised when reading an empty CSV file.	Pass
D-T-CSV-RDC-004	Confirm that an InvalidHeaderColumns exception is raised for a CSV file with incorrect header columns.	Pass
D-T-CSV-RDC-005	Ensure that an InvalidHeaderFormat exception is raised for a CSV file with an incorrect header format.	Pass
D-T-CSV-RDC-006	Verify that a NoDataLinesError is raised when a CSV file contains only a header and no data lines.	Pass
D-T-CSV-RDC-007	Confirm that a NoValidLinesError is raised when all data lines in a CSV file are invalid.	Pass
D-T-CSV-RDC-008	Ensure that lines with an incorrect number of columns are skipped and logged.	Pass
D-T-CSV-RDC-009	Verify that lines with empty fields are skipped and logged appropriately.	Pass
D-T-CSV-RDC-010	Confirm that lines with parsing errors are skipped and logged correctly.	Pass
D-T-CSV-RDC-011	Ensure that lines are skipped and logged if the status parser returns None.	Pass

Test ID	Description	Status
D-T-DAT-AEW-001	Ensure that adding entries with identical values is handled correctly by the Data object.	Pass

Test ID	Description	Status
D-T-DAT-AME-001	Verify that adding multiple entries maintains proper sorting within the Data object.	Pass
D-T-DAT-ASE-001	Test adding a single entry to the Data object and ensure related lists and values are updated correctly.	Pass
D-T-DAT-CSC-001	Verify that a new Data object correctly maintains a collection of test IDs for each status.	Pass
D-T-DAT-INI-001	Verify that a new Data object initializes with empty lists and dictionaries.	Pass

Test ID	Description	Status
D-T-LOG-EMS-001	Test logging of empty strings to ensure the Logger handles them gracefully.	Pass
D-T-LOG-ERR-001	Ensure that error messages are logged appropriately at the ERROR level.	Pass
D-T-LOG-INF-001	Verify that informational messages are logged correctly at the INFO level.	Pass
D-T-LOG-SIN-001	Confirm that the Logger class adheres to the singleton pattern.	Pass
D-T-LOG-SLF-001	Test setting the log folder to ensure logs are directed to the specified location.	Pass
D-T-LOG-SLU-001	Verify that resetting the log folder removes and closes existing log file handlers properly.	Pass
D-T-LOG-SPC-001	Verify that messages containing special characters are logged without issues.	Pass
D-T-LOG-SVD-001	Confirm that disabling verbose logging works correctly.	Pass
D-T-LOG-SVE-001	Ensure that enabling verbose logging functions as expected.	Pass

Test ID	Description	Status
D-T-LOG-WAR-001	Confirm that warning messages are logged correctly at the WARNING level.	Pass

Test ID	Description	Status
D-T-ORC-LFC-001	Confirm that an OutputFolderError is raised when the program fails to create the log folder.	Pass
D-T-ORC-OFC-001	Ensure that an OutputFolderError is raised when the program cannot create the output folder.	Pass
D-T-ORC-RFE-001	Ensure that FriendlyException during data reading is handled by logging the error and exiting gracefully.	Pass
D-T-ORC-RFE-002	Verify that FriendlyException during data export is handled by logging the error and exiting gracefully.	Pass
D-T-ORC-RUE-001	Confirm that unexpected exceptions are not handled internally and are allowed to propagate as intended.	Pass
D-T-ORC-SSK-001	Test that the sort key can be successfully updated using the set_sort_key method.	Pass

Test ID	Description	Status
D-T-PAR-DPV-001	Test various valid and invalid duration strings to ensure correct parsing by the DurationParser.	Pass
D-T-PAR-DPV-002	Confirm that invalid numeric values in duration strings are handled gracefully by the DurationParser.	Pass
D-T-PAR-SPE-001	Test that empty status strings are handled appropriately by the StatusParser.	Pass
D-T-PAR-SPS-001	Ensure that status strings with leading and trailing spaces are parsed accurately by the StatusParser.	Pass
D-T-PAR-SPV-001	Verify that valid status strings are parsed correctly by the StatusParser.	Pass

Test ID	Description	Status
D-T-PAR-TCE-001	Ensure that test case strings with empty segments are handled correctly by the parser.	Pass
D-T-PAR-TCI-001	Verify that improperly formatted test case strings trigger appropriate error handling in the parser.	Pass
D-T-PAR-TCV-001	Confirm that valid test case strings are parsed correctly by the TestCaseParser.	Pass
D-T-PAR-TCV-002	Ensure that test case strings with extra spaces are parsed accurately by the TestCaseParser.	Pass

Test ID	Description	Status
D-T-PRI-DAO-001	Test the advanced output method to ensure it generates a well-structured table with headers and data rows.	Pass
D-T-PRI-DBO-001	Verify that the basic output method correctly formats and displays each entry's information line by line.	Pass
D-T-PRI-DRF-001	Ensure that analysis results are displayed in a properly formatted table with correct alignment and separators.	Pass
D-T-PRI-DRN-001	Verify that the display results method correctly handles scenarios with no analysis results to show.	Pass
D-T-PRI-DRN-002	Confirm that analysis results are displayed correctly without formatting when specified.	Pass
D-T-PRI-GWD-001	Ensure that table column widths are accurately calculated based on header and data lengths.	Pass
D-T-PRI-GWE-001	Confirm that column widths are set correctly when there is no data, relying solely on header lengths.	Pass
D-T-PRI-GWL-001	Verify that column widths adjust appropriately when data values exceed header lengths.	Pass

Appendix

Test ID Structure

The Test ID naming convention follows the structure:

```
[Source]-[Type]-[Module]-[Category]-[Sequential Number]
```

Components of the Test ID

1. **Source**:
   - `C` : Client-facing (tests required by the client)
   - `D` : Developer-facing (internal tests, module-level tests, etc.)
2. **Type**:
   - `T` : Test
3. **Module**:
   - `AN` : Analyser module (e.g., `analyser.py`)
   - `CSV` : CSV Handler module (e.g., `csv_handler.py`)
   - etc.
4. **Category**:
   - Describes the specific function or focus of the test (e.g., validation, parsing, etc.).
5. **Sequential Number**:
   - A unique identifier within the scope of the source, type, module, and category.

Example

- `D-T-CSV-RDC-001` : A developer-facing test (`D`) for the CSV module (`CSV`), specifically focusing on reading CSV files (`RDC`), and is the first in its sequence (`001`).
- `C-T-AN-GDU-001` : A client-facing test (`C`) for the Analyser module (`AN`), focusing on calculating total duration (`GDU`), and is the first in its sequence (`001`).

Glossary

Term	Definition
CSV	Comma Separated Values. A file format used to store tabular data.
SRS	Software Requirements Specification. A document that describes the intended purpose and environment for software under development.

Term	Definition
Singleton	A design pattern that restricts the instantiation of a class to one object.
Orchestrator	A class that coordinates and manages the execution of other classes or modules in a system.