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Author(s)	Rasel Ahmed (TVS)
Reviewer(s)	Miah Raihan Mahmud Arman (TVS) Tanvir Islam (TVS)
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Project Coordinator	Vorarlberg University of Applied Sciences
Tel	+43 (0) 5572 792 7128
E-mail	florian.maurer@fhv.at
Project website address	www.jidep.co

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Executive Summary

The Quality Assurance (QA) Testing Report for the JIDEP project, employing Playwright and JMeter as the primary testing frameworks, encompasses critical insights essential for ensuring the reliability and functionality of the JIDEP platform. Through comprehensive test scenarios and leveraging Playwright's automation capabilities alongside JMeter's load-testing functionalities, various issues, including functional discrepancies, performance bottlenecks, and UI inconsistencies, were systematically identified and documented. Recommendations have been proposed to refine test scenarios, optimize test scripts, and implement best practices for cross-browser compatibility and load handling, aiming to enhance the overall quality and performance of the JIDEP platform. By addressing these findings and implementing the recommended improvements, JIDEP is positioned to deliver a seamless and consistent user experience across diverse environments under varying loads.

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1. Introduction

The goal of this document is to describe the testing and refinement of the JIDEP platform developed to help organizations to unlock the value of data, leading to the development of more sustainable solutions, technologies, and materials.

The objective of these tests is to ensure that the platform meets user requirements. Several types of testing have been developed to verify the functionality of different features designed to assist users from different sectors in collaborative, mutually beneficial knowledge and data-sharing relationships. Test results have been collected from both manual and automated testing and allocated to the JIDEP platform development team to decide the type of solution required and proceed with refinement. In this report we will only focus on the automated testing, the manual testing will be reported in D4.4 User-acceptance Testing report.

2. Methodology

2.1 Overview

The development and user acceptance testing of the JIDEP platform was carried out using the Agile approach (Figure 1), which proceeds in iterations until the desired quality of a feature in the software is achieved. At the end of each iteration, user feedback and comments are gathered to improve the software further in the next iteration.

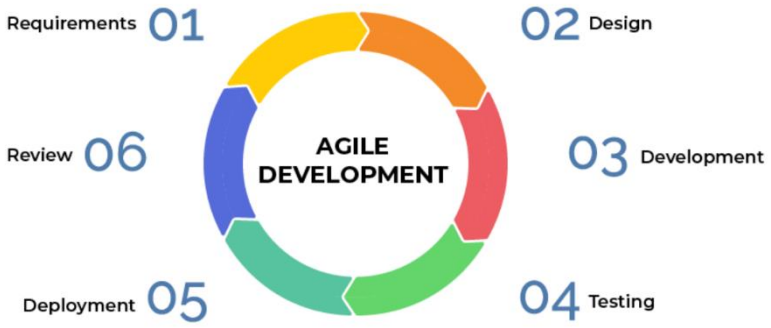

Figure 1: Agile approach for development and testing.

One of the advantages of the Agile methodology is that while testing, further development, and improvement iterations, end-users might tune their initial requirements in discussion with the development team so that the underlying components of a feature can be better optimised and can enhance the overall quality of the software. Another advantage of this methodology is that it is not a documentation-intensive methodology; therefore, end users can quickly change their requirements. The development team can also commence the corresponding implementation tasks without spending much time understanding the requirements.

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2.2 Testing JIDEP Platform

Testing the JIDEP Platform to be deployed as a web application was carried out by the following Agile testing methodology described in Section 2.1. The purpose of the testing is to verify whether the developed JIDEP Platform meets the requirements identified in the JIDEP project and fulfils the expectations of users involved in different sectors. The testing of the JIDEP Platform includes the following important steps:

- Selection and customisation of documentation template
- Identification of scope and requirements-based test cases
- Definition of assumptions and constraints
- Identification of risks and remedies
- Invitation for testing and assignment of responsibilities
- Specification of entry criteria
- Compilation of test results

2.3 Selection of testing tools

We have investigated different testing methodologies and tools to perform the testing of JIDEP platform. We have selected to use “Playwright” to perform the UI testing as it serves as a comprehensive end-to-end testing library and enables conducting UI tests. Playwright supports all modern rendering engines including Chromium, WebKit, and Firefox. It tests on Windows, Linux, and macOS, locally or on CI, headless or headed.

We have selected to conduct Load and Stress testing using “JMeter”. Testing with JMeter determines whether the JIDEP platform under test can satisfy high load requirements or not. It also helps to analyze the overall server under heavy load.

2.4 Identification of Integration test cases

Scope identification is tightly coupled with the features available in the JIDEP Platform. Depending on the maturity level, the features are classified into two groups: “within testing scope” and “out of testing scope” (Table 1). Features belonging to the testing scope group are tested, and features belonging to the out-of-testing scope group are not tested.

Table 1: Integration test scope

Features - within Automated Integration Scope	**Features - out of Automated Integration scope**
In Scope *List of features that will be tested* **INT1:** *User Login* **INT 2:** *List of Material Passport page:* **INT 3:** *Create Passport:* **INT 4:** *Create Passport - Application* **INT 5:** *Create Passport - Documents* **INT 6:** *Create Passport - Identifier* **INT 7:** *Create Passport - Physical Properties*	Out of Scope *List of features that will not be tested.* **INT 12:** *Create Passport - Environmental Performance - Under construction*

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INT 8: *Create Passport - Composition Properties* **INT 9:** *Create Passport - Composition Properties - Add Sub-assembly Information tab*	
INT 10: *Create Passport - Circular Economy: Applied Circularity/ EoL Strategy* **INT 11:** *Create Passport - Circular Economy: Circularity Index* **INT 13:** *List Material Passport page- Verify Created Passport* **INT 14:** *Material Passport Tab* **INT *15:*** *Scan to View* **INT *16:*** *Passport Data Validation* **INT *17:*** *Publish in Marketplace* **INT *18*:** *Publish in Catalog* **INT *19*:** *Mark as Old* **INT 20*:*** *Collaborative Space* **INT 21:** *Collaborative Space - User Management* **INT 22:** *Collaborative Space - User Management – Add New User* **INT 23:** *Validate Email Generation and activate status* **INT 24:** *Collaborative Space - Validate User Status after accepting invitation* **INT 25:** Log Out	

As for the Integration test cases, this subsection emphasises how the corresponding features, which are also included in the Integration scope group, are thoroughly tested by the testers of the JIDEP Platform. The automated test result generated from Playwright allows users to report both a successful test and a failed test. We can report unexpected system behaviours regardless of the success or failure of a test. All test cases are documented in Annex A.

2.5 Definition of assumptions and constraints

The INT test cases are described relying on the test environment's assumptions, test documentation, and how to report test outcomes. Assumptions are listed in Table 2, and constraints on the testing are listed in Table 3. The JIDEP Platform has been developed and tuned to run on different Windows operating systems and macOS versions. In the development of this tool, many browsers have been taken into consideration. However, to complete the testing campaign on time, we have imposed constraints on the types of operating systems and browsers and included only those used during the development phase.

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Table 2: Test assumptions

Test environment	All INT automated test cases were conducted in JIDEP platform - https://automated-test.jidep.co/
Test documentation	All INT automated test cases are documented in the Test Case Template
Test result report	Success, Errors, failures and feedback are to be reported in test results template

Table 3: Test constraints

Time frames	Testing has been carried out for 5 times
Resources	• Tested operating systems: Windows 10. MacOS • Tested browsers: Chrome, Safari, Firefox and Microsoft Edge • Tools: Playwright, JMeter

2.6 Identification of risks and remedies

Testers play a crucial role in successfully finishing the user acceptance tests. Those who take part in a testing process might have different backgrounds and skill sets. Communicating different use cases and scenarios supported by the features with testers is a non-trivial task. To ensure the effective execution of tests, we have analysed the Integration and Load/Stress tests and corresponding processes, identified potential risks, and resolved them (Table 4). One example of risk is that testers might not be able to complete tests due to the lack of understanding of the JIDEP Platform's test features.

Table 4: Integration Test Risks

Description	Probability	Impact	Mitigation
Less Quality and reliability of the testing	Medium	Medium	To ensure the quality and reliability of integration testing, we monitored and measured various aspects of the application performance, functionality, usability, and security.
Time and cost inefficiencies	Medium	Medium	We released JIDEP platform before testing. Automating with Playwright helped to speed up and streamline the testing process, as well as reduced the need for human resources and infrastructure.
Error handling: The testers might not know how to properly report errors and bugs while testing	Low	High	We provided an easy-to-use error-reporting solution within the test template.
Test failure	Low	High	We have tested only the completed features. Incomplete features were not tested and will be tested in the next round.

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2.7 Specification of entry criteria

Entry criteria are applied to set the standard for a feature to qualify to be selected for the Integration test. A feature must be complete, and integration tested. Any bugs found during unit or integration tests or by other means were fixed, and the system was Unit tested. The feature is introduced to the selected testers to enable them to commence and carry out the test without seeking further assistance.

Table 5: Test criteria

ID	Criteria
C1	The development of the feature to be tested is fully completed
C2	The Code is ready in the expected environment < https://automated-test.jidep.co/ >
C3	Environment readiness is ensured

2.8 Compilation of test results

The Quality Assurance (QA) manager is responsible for collecting test results. The QA manager analyses the results against each feature and checks how many testers have run it successfully and how many have failed. The QA manager summarises the results in a table to fix the potential issues and further improve the features based on the test results generated from Playwright. The test result will cover the total Number of scripts, list of all test cases in tabular form, test Result (Passed/Failed status of every test case), duration, machine/environment Name.

3. JIDEP Platform Refinement

3.1 Overview

All issues reported and comments provided were discussed with the JIDEP Platform development team. Reproduction of an issue at the developers' end is critical to detect the root cause and eventually fix it. A comment may provide additional information about an issue that often helps the development team get more insight into the issue or request improvement or extension of a feature. Requests for extending features and adding new material information are beyond the scope of this task. As part of the refinement activity, we addressed everything except such extension requests. A brief description of the refinement status of the features is provided below.

3.2 INT1: User Login

- Login page: https://automated-test.jidep.co/
- Login with valid credentials (Email and Password).
- Redirected to the homepage with automatic login.

3.3 INT 2: List of Material Passport page

- Click material passport page form L1.
- Material Passport page contains list of passports, Passports can be clickable and opened, Create New Passport option.
- Sort functionality is available.

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3.4 INT 3: Create Passport:

- Create Passport Link will be clickable and will lead to Application page.

3.5 INT 4: Create Passport – Application

- Application Page will contain Automative, PCB, Wind Turbine option. All of them will be clickable, user should choose one of them.

3.6 INT 5: Create Passport – Documents

- Clicking Application page will lead to Documents page.
- Documents page will have Drop Down option with Document type to upload and upload option by choosing file and going to Next page after Upload.
- Next and Previous page option will be available.

3.7 INT 6: Create Passport – Identifier

- Identifier page will be after Document page.
- The page will contain Name field (Required), Brand Name field (Required), Trade Name field, GTIN field, EAN field, Description field (Required), Images field (Required), Manufacturer Name field (Required), Manufacturer Registration field (Required), Manufacturer Registration country from the drop-down (Required), Enter Supplier Name field, Supplier Registration number field, Supplier Registration country from the drop-down field.
- Next and Previous page option will be available.

3.8 INT 7: Create Passport - Physical Properties

- Page will contain options to Enter Length, select Length Unit; enter Width, select Width Unit; enter Height, select Height Unit, Under Mass - Enter Mass, select Mass Unit (Required), Under Density - Enter Density, select Density Unit from dropdown, Under Energy and thermal performance - enter Heat transfer coefficient, select unit, enter Thermal conductivity, select unit.
- Next and Previous page option will be available.

3.9 INT 8: Create Passport - Composition Properties

- Page will have add Sub-assemblies opt option where the user can click to add Subassembly
- Next and Previous page option will be available.

3.10 INT 9: Create Passport - Composition Properties - Add Sub-assembly Information tab

- Add Sub-assembly information tab will contain Select Sub-assembly Level (Required), Sub-assembly Serial (Required), Enter Sub-assembly Name, Mass (kg) (Please note: Mass note has to must be equal or less than total mass), Mass Ratio will auto generate, Enter Fraction of mass from recycled sources (%), Fraction of mass from reused sources (%), Fraction of mass collected to go into a recycling process (%), Fraction of mass going into component reuse (%), Efficiency of the recycling process used for collected for recycling, Efficiency of the recycling process used to produce recycled feedstock.

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- Close / Add option will be available.

3.11 INT 10: Create Passport - Circular Economy: Applied Circularity/ EoL Strategy

- The page will have option to choose Document Type from Drop Down, upload document.
- Next / Previous option will be available.

3.12 INT 11: Create Passport - Circular Economy: Circularity Index

- Circularity Index chart should be displayed with correct calculation.
- Next / Previous option will be available.

3.13 INT 12: Create Passport - Environmental Performance

- Page will contain Enter Functional Unit, Carbon Footprint, Unit, Water Footprint, Unit, Impact assessment methodology, Impact for different midpoint categories, Impact for different endpoint categories.
- Next / Previous option will be available.

3.14 INT 13: List Material Passport page-Verify Created Passport

- Created passport will be available.
- Passports and Create Passport buttons will be available.

3.15 INT 14: Material Passport Tab

- Tab containing Passport name, Domain, Mass, Manufacturer information, Scan to view option with Barcode, Click here for more details Options.

3.16 INT 15: Scan to View

- Scanning the Barcode with Phone will open the tab in phone

3.17 INT 16: Passport Data Validation

- Clicking “Click here for more details” will open Data Authentication page which will contain -
    - Passport Name
        - Domain
        - Trade Name
        - Brand Name
        - GTIN
        - EAN
        - About this item
    - COMPOSITION PROPERTIES - Sub-assembly
        - Sub-assembly
        - Name
        - Mass
        - % of mass from Recycled source
        - % of mass from Reused source
- Documents
        - MSDS
        - Attachment

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- Circularity Documents
    - REFURBISH:
        - Manufacturer
            - Name
            - Registration Number
            - Registration Country
        - Supplier
            - Name
            - Registration Number
            - Registration Country
        - PHYSICAL PROPERTIES
            - Dimensions
            - Mass
            - Density
            - Heat Transfer Coefficient
            - Thermal Conductivity
        - CIRCULAR ECONOMY
            - Circularity Indicator
        - ENVIRONMENTAL PERFORMANCE
            - Functional Unit
            - Carbon Footprint
            - Water Footprint
            - Impact Assessment Methodology
            - Midpoint Category
            - Endpoint Categories

3.18 INT 17: Publish in Marketplace

- Clicking Publish in Marketplace button under Data Authenticity will open tab which will contain - Enter Standard price, Enter List price, click “Publish” options.

3.19 INT 18: Publish in Catalog

- Clicking Publish in Catalogue button will be available.

3.20 INT 19: Mark as Old

- Clicking Mark as Old button will be available.

3.21 INT 20: Collaborative Space

- Collaborative space page will contain User management and Shared Passports option.
- Add New User Option will be available.
- List of Users will be displayed.

3.22 INT 21: Collaborative Space - User Management

- The User Management Page will contain List of Company Users.
- The list will contain Roles, Name, Email, Status, Action.
- Add New User Option will be available.
- Roles will be either Admin, Editor or Publisher.
- Status will be either Active or Not active.

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- Action will have Edit or Delete options.

3.23 INT 22: Collaborative Space - User Management – Add New User

- Tab will have Enter Name, Email, Choose Role from drop down arrow.

3.24 INT 23: Collaborative Space - Validate Email Generation and activate status

- Email will be generated for new user creation. The added user can accept the invitation and it will activate the account.

3.25 INT 24: Collaborative Space - Validate User Status after accepting invitation

- User status will show as not active until the added user accepts the invitation. Will show as Active after accepting.

3.26 INT 25: Log out

- User should be able to log out.

Conclusions

This report outlines the development, demonstration, testing, and refinement processes of the JIDEP Platform. Utilizing the Agile methodology facilitated seamless integration and load/stress testing, enabling swift adaptation to evolving end-user requirements. Twenty-five features were identified within the integration scope, with testing aimed at verifying their functionality and enhancing user experience through feedback collection. Notably, all features demonstrated flawless performance without eliciting any issues or comments. Furthermore, thorough analysis and resolution of all feedback, comments, and issues have been diligently executed, ensuring continuous improvement and refinement of the JIDEP Platform.

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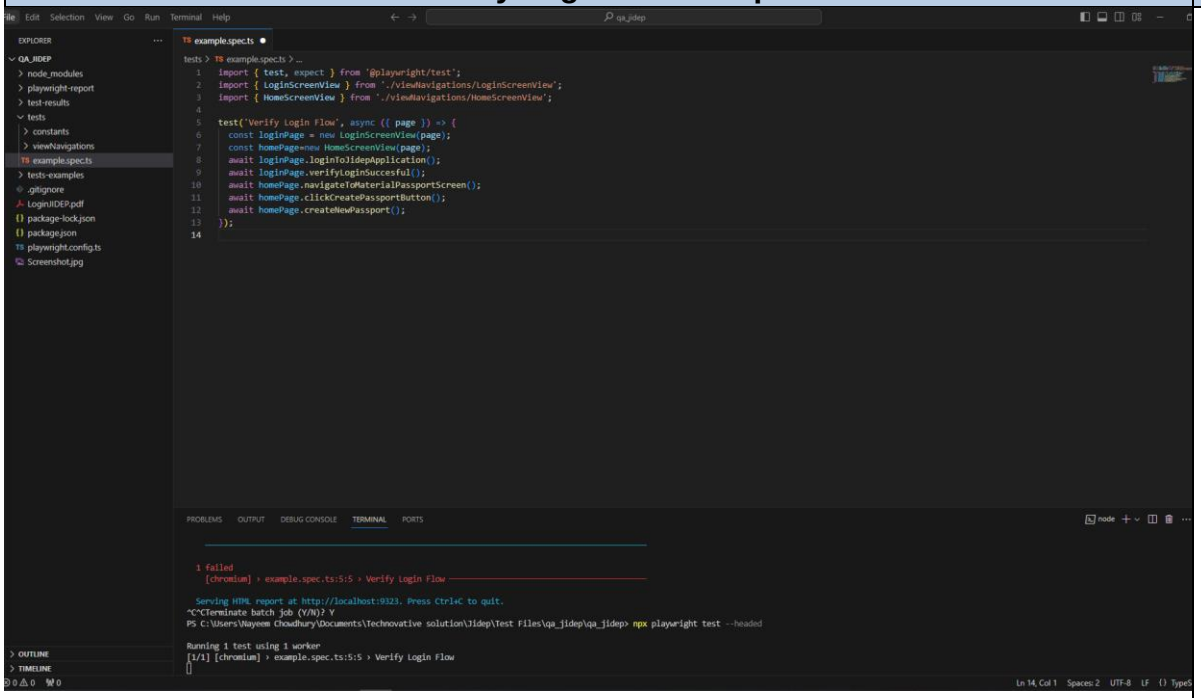
Annex A: INT Test template

Integration Testing (INT):
The purpose of the integration test is to confirm that the JIDEP Platform is ready for operational use. During the integration Test, you will evaluate the Platform to its initial requirements or features.

INT Assumptions
- **Test environment**: The test cases will be conducted in https://automated-test.jidep.co/ platform - **Test documentation**: All INT test cases are documented in INT Requirements Based Test Cases table - **Test result report**: Success, Errors, failures and other results will be received from Playwright and JMeter

Playwright Test Scripts




```
import { test, expect } from '@playwright/test';
import { LoginScreenView } from './viewNavigations/LoginScreenView';
import { HomeScreenView } from './viewNavigations/HomeScreenView';

test('Verify Login Flow', async ({ page }) => {
  const loginPage = new LoginScreenView(page);
  const homePage=new HomeScreenView(page);
  await loginPage.loginToJidepApplication();
  await loginPage.verifyLoginSuccesful();
  await homePage.navigateToMaterialPassportScreen();
  await homePage.clickCreatePassportButton();
```

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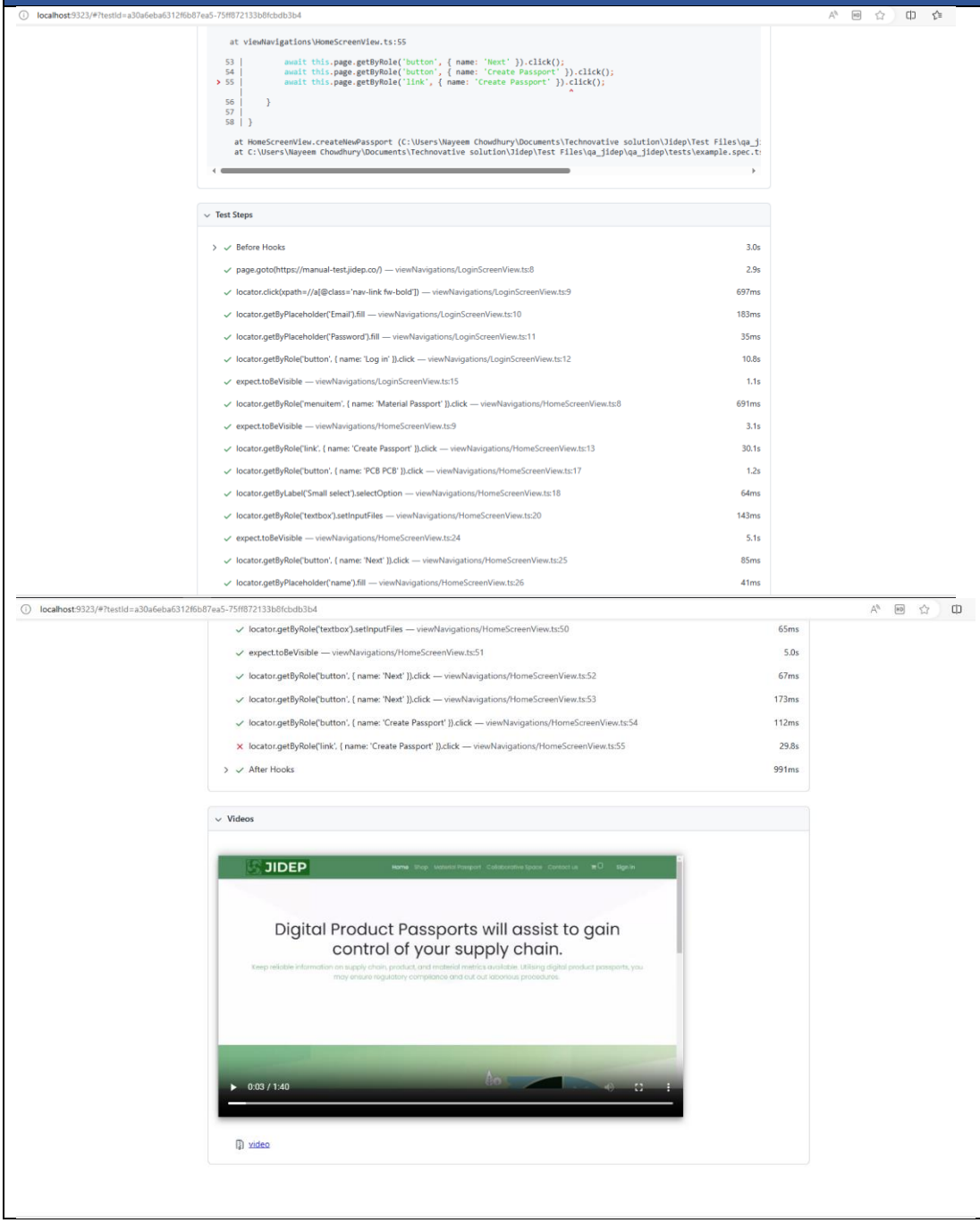
```
  await homePage.createNewPassport();
});
```

Playwright Test Results



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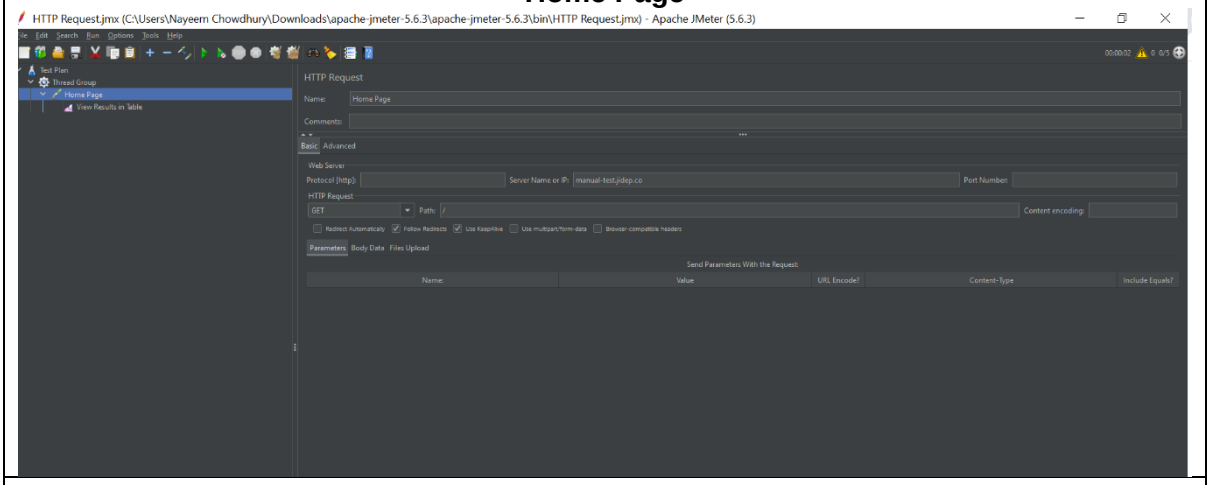
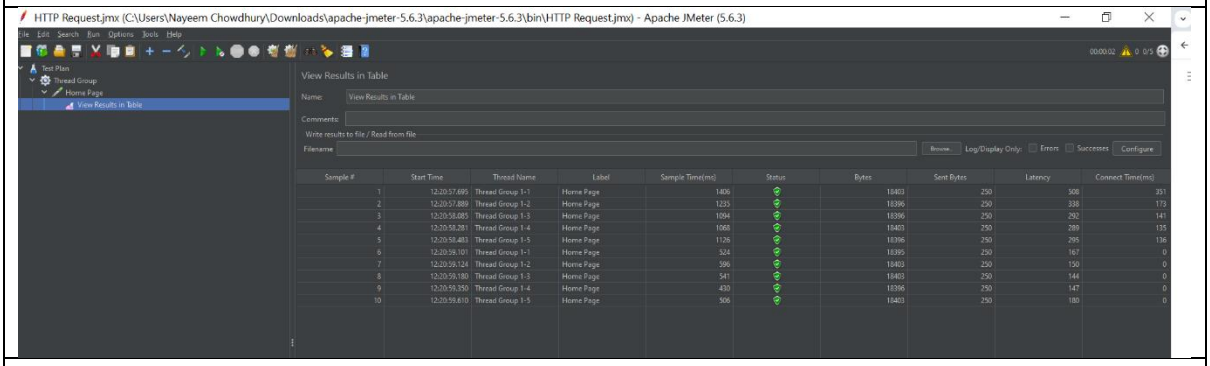
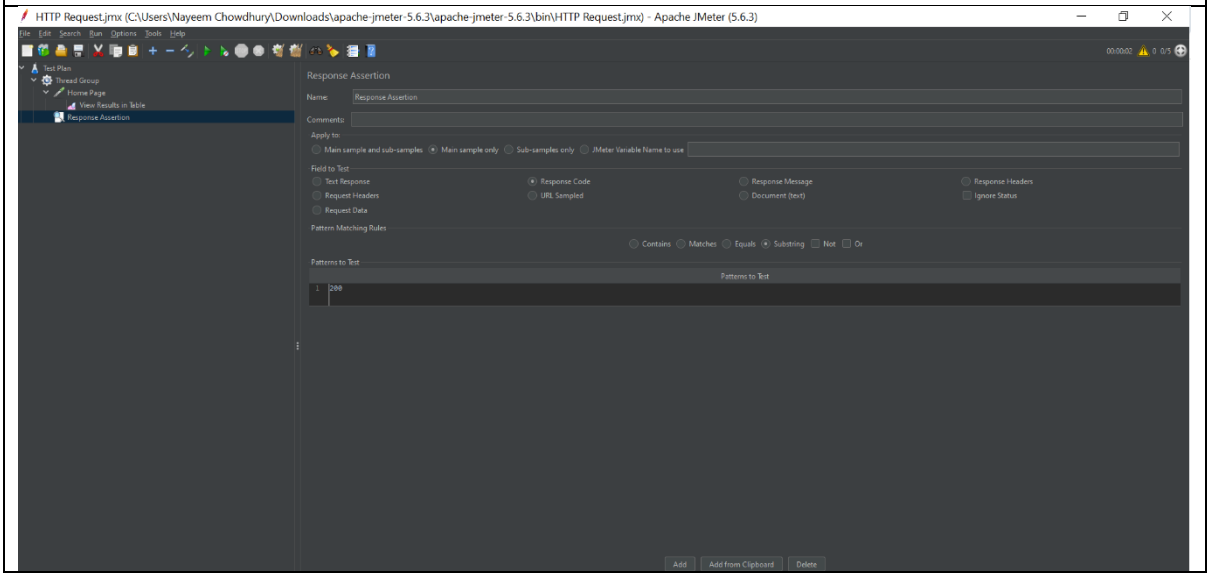
Performance Test JMeter

Home Page







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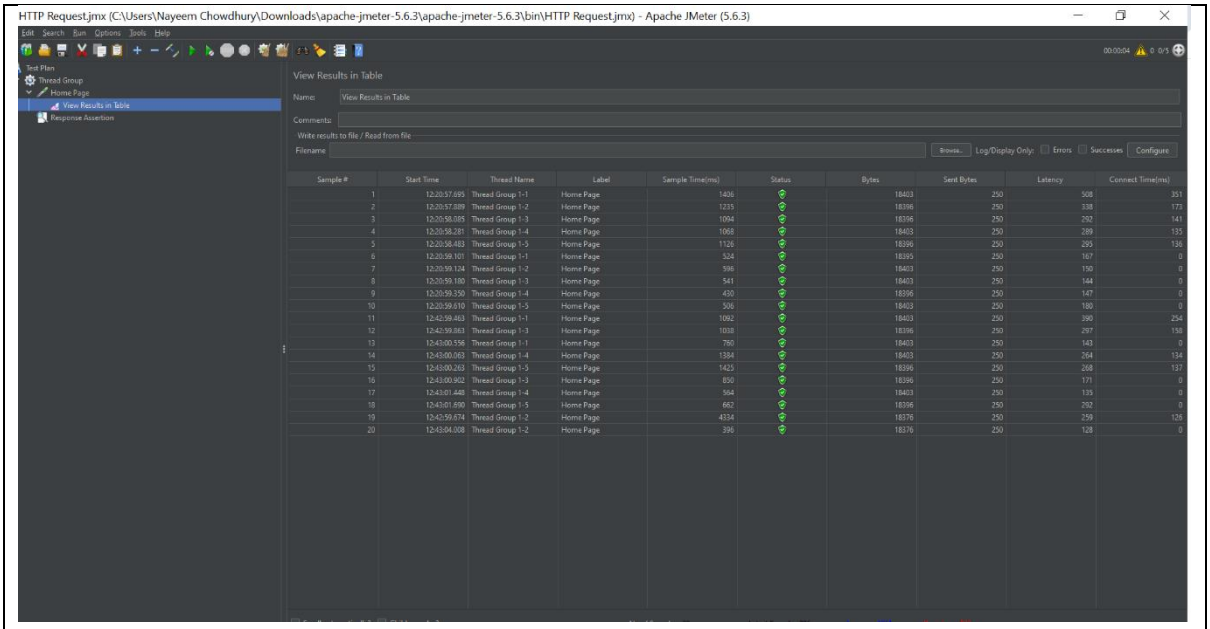

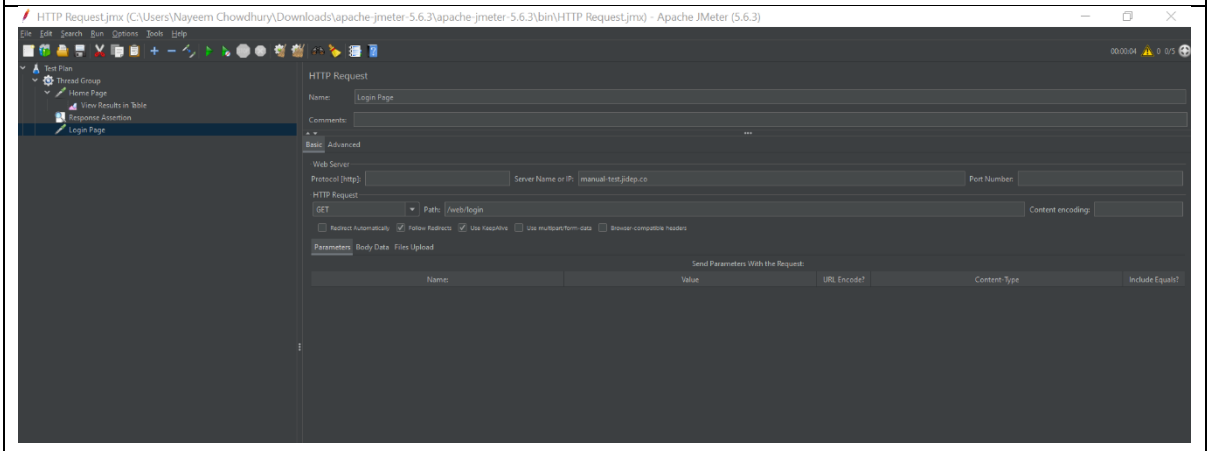

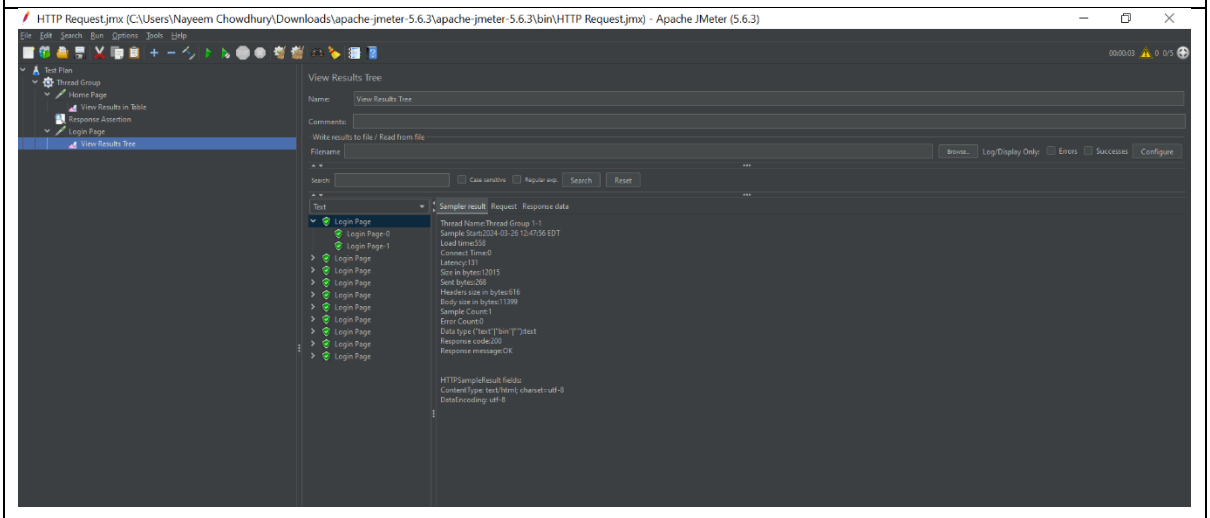

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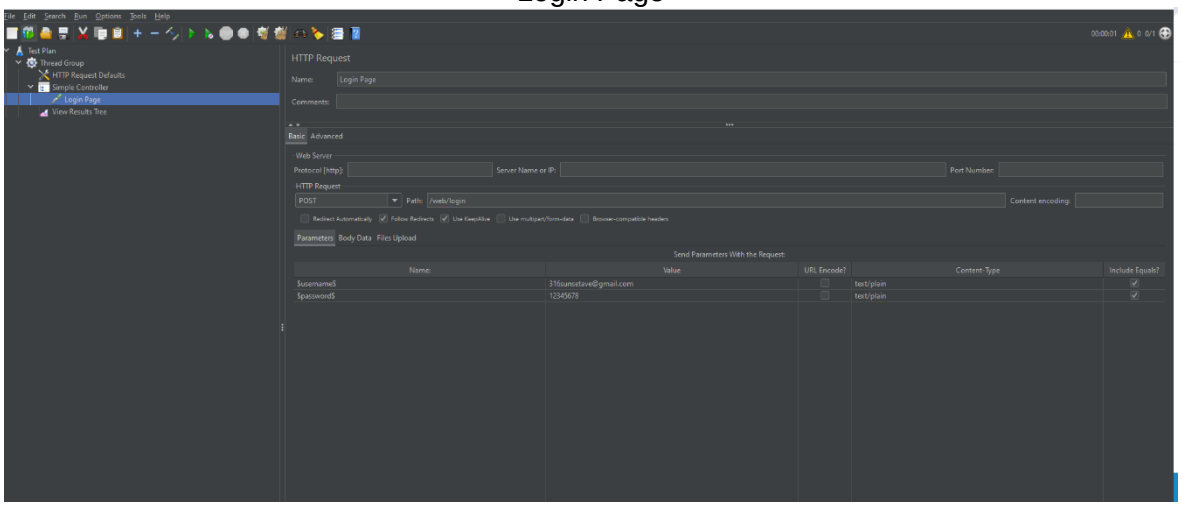
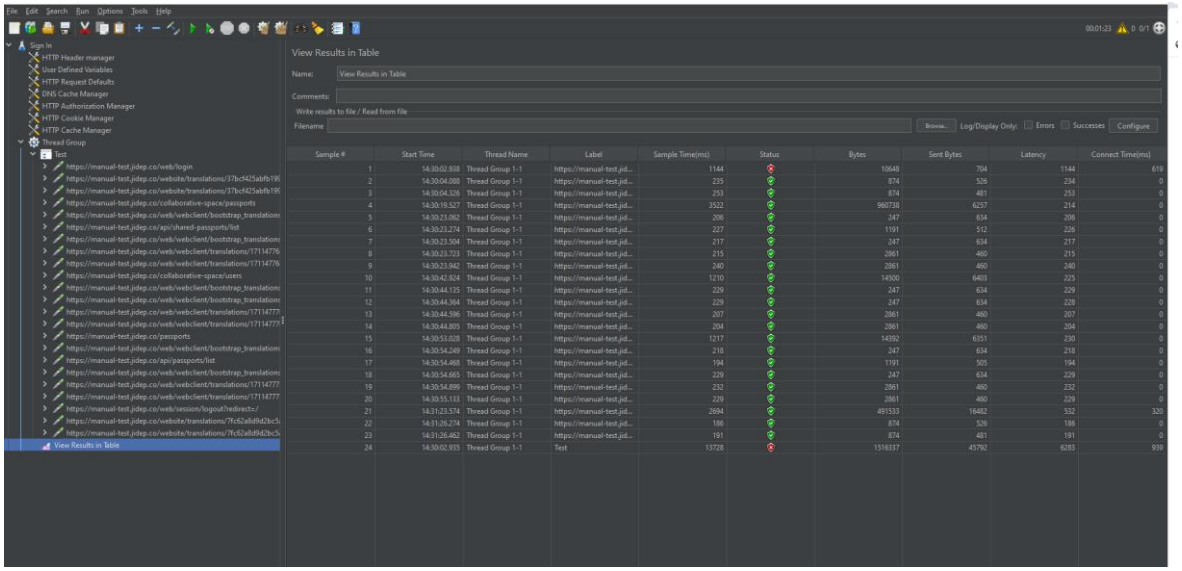
Login Page



Overall Performance Test Result



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