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**CS423 - Software Testing**  
**HOMEWORK**  
**AUTOMATION TESTING**

HCMC – Dec, 2025

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## **1. Introduction**

### **1.1 Purpose**

This report documents the automation testing process for The Toolshop web application, focusing on three high-priority features: Sign Up, Search and Filter Products, and Create Category (Admin).

### **1.2 Scope**

The testing covers:

- Functional testing of three main features
- Multi-browser testing (Chrome, Firefox, Edge)
- Data-driven testing approach
- Security testing (SQL injection, XSS)
- Boundary value analysis
- Negative testing scenarios

### **1.3 Objectives**

- Validate core functionality works as expected
  - Identify bugs and defects
  - Ensure cross-browser compatibility
  - Test edge cases and boundary conditions
  - Verify security controls
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## **2. Test Environment Setup**

### **2.1 Hardware Configuration**

- Operating System: Windows 11 Pro
- Processor: Intel Core i7-10750H @ 2.60GHz
- RAM: 16 GB DDR4
- Display Resolution: 1920x1080

## 2.2 Software Configuration

- Python Version: 3.11.5
- Selenium WebDriver: 4.15.2
- Pytest: 7.4.3
- Additional Libraries:
  - pytest-html: 4.1.1
  - webdriver-manager: 4.0.1
  - openpyxl: 3.1.2
  - pandas: 2.1.3
- Browsers:
  - Google Chrome: Version 120.0.6099.130
  - Mozilla Firefox: Version 121.0
  - Microsoft Edge: Version 120.0.2210.91

## 2.3 Application Under Test

- Application: The Toolshop
- Version: sprint5-with-bugs
- URL: <https://with-bugs.practicesoftwaretesting.com>
- API: <https://api-with-bugs.practicesoftwaretesting.com>
- GitHub: <https://github.com/testsmith-io/practice-software-testing>

## 2.4 Test Accounts

- Admin: [admin@practicesoftwaretesting.com](mailto:admin@practicesoftwaretesting.com) / welcome01
  - User: [customer@practicesoftwaretesting.com](mailto:customer@practicesoftwaretesting.com) / welcome01
- 

# 3. Features Tested

## 3.1 Feature 1: Sign Up (40 points)

**Description:** User registration functionality allowing new users to create accounts.

**Priority:** High

**Test Coverage:**

- Valid registration scenarios
- Invalid input handling
- Field validation

- Duplicate email detection
- Password strength validation
- Security testing (SQL injection, XSS)
- Boundary value testing

**Total Test Cases:** 15

### **3.2 Feature 2: Search and Filter Products (30 points)**

**Description:** Product search and filtering functionality for users to find products.

**Priority:** High

**Test Coverage:**

- Keyword search
- Brand filtering
- Category filtering
- Price range filtering
- Combined filters
- Empty results handling
- Security testing

**Total Test Cases:** 20

### **3.3 Feature 3: Create Category - Admin (30 points)**

**Description:** Admin functionality to create new product categories.

**Priority:** High

**Test Coverage:**

- Valid category creation
- Duplicate category handling
- Field validation
- Special characters
- Unicode support
- Parent category selection
- Security testing

Total Test Cases: 15

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## 4. Test Approach and Methodology

### 4.1 Testing Approach

**Data-Driven Testing:** All test cases use external CSV files containing test data, enabling easy maintenance and scalability.

**Page Object Model (POM):** Implemented POM design pattern for better code organization and reusability.

**Multi-Browser Testing:** Tests execute on Chrome, Firefox, and Edge browsers to ensure cross-browser compatibility.

### 4.2 Test Design Techniques

1. **Equivalence Partitioning:** Grouping similar inputs
2. **Boundary Value Analysis:** Testing min/max values
3. **Negative Testing:** Invalid inputs and error conditions
4. **Security Testing:** SQL injection and XSS attempts
5. **Regression Testing:** Ensuring existing functionality works

### 4.3 Key Technologies

- **Selenium WebDriver:** Browser automation
  - **Pytest:** Test framework and assertions
  - **WebDriver Manager:** Automatic driver management
  - **Pandas/OpenPyXL:** Excel report generation
  - **CSV:** Test data management
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## 5. Test Cases and Data

### 5.1 Sign Up Test Cases

Test Case ID	Description	Test Data	Expected Result
TC_SIGNUP_001	Valid signup with all fields	Valid user data	Success
TC_SIGNUP_002	Valid signup different data	Valid user data	Success
TC_SIGNUP_003	Empty all fields	Empty strings	Fail - validation error
TC_SIGNUP_004	Minimum valid inputs	Min length data	Success
TC_SIGNUP_005	Maximum length inputs	Max length data	Success
TC_SIGNUP_006	Duplicate email	Existing email	Fail - duplicate error
TC_SIGNUP_007	Invalid email format	Invalid email	Fail - format error
...	...	...	...

### 5.2 Search and Filter Test Cases

Test Case ID	Description	Filters Applied	Expected Result
TC_SEARCH_001	Search for hammer	Keyword: hammer	Success - results found
TC_SEARCH_002	Search for pliers	Keyword: pliers	Success - results found
TC_SEARCH_005	Filter by brand	Brand: ForgeFlex	Success - filtered results



Test Case ID	Description	Filters Applied	Expected Result
TC_SEARCH_007	Filter by category	Category: Hand Tools	Success - filtered results
TC_SEARCH_009	Price range filter	Price: 10-50	Success - filtered results
TC_SEARCH_015	All filters combined	All filters	Success - filtered results
...	...	...	...

### 5.3 Create Category Test Cases

Test Case ID	Description	Test Data	Expected Result
TC_CATEGORY_001	Create valid category	Valid name + slug	Success
TC_CATEGORY_004	Empty category name	Empty string	Fail - validation error
TC_CATEGORY_008	Duplicate category	Existing name	Fail - duplicate error
TC_CATEGORY_009	XSS injection	Script tags	Fail - sanitized
TC_CATEGORY_013	Unicode characters	Chinese text	Success
...	...	...	...

## 6. Test Execution and Results

### 6.1 Execution Summary

**Execution Date:** December 8-10, 2025 **Total Test Cases:** 50 (15 + 20 + 15) **Total Executions:** 150 (50 test cases × 3 browsers) **Execution Duration:** ~45 minutes (all browsers) **Pass Rate:** 80% (120 passed / 150 total executions)

### 6.2 Test Results by Feature

#### Feature 1: Sign Up

- Total Test Cases: 15
- Passed: 12
- Failed: 3
- Pass Rate: 80%
- **Failed Tests:** TC\_SIGNUP\_006 (Duplicate email), TC\_SIGNUP\_012 (SQL injection), TC\_SIGNUP\_013 (XSS in first name)

#### Browser-wise Results:

Browser	Passed	Failed	Pass Rate
Chrome	12	3	80%
Firefox	12	3	80%
Edge	12	3	80%

**Analysis:** All browsers showed consistent results. The failures are related to security vulnerabilities (XSS/SQL injection) and validation issues (duplicate email detection).

#### Feature 2: Search and Filter

- Total Test Cases: 20
- Passed: 17
- Failed: 3
- Pass Rate: 85%
- **Failed Tests:** TC\_SEARCH\_016 (XSS injection), TC\_SEARCH\_017 (SQL injection), TC\_SEARCH\_019 (Invalid price range)

#### Browser-wise Results:

Browser	Passed	Failed	Pass Rate
Chrome	17	3	85%
Firefox	17	3	85%
Edge	17	3	85%

**Analysis:** Good pass rate. Failures are primarily security-related (XSS/SQL injection) and edge case validation (invalid price ranges).

### Feature 3: Create Category

- Total Test Cases: 15
- Passed: 11
- Failed: 4
- Pass Rate: 73%
- **Failed Tests:** TC\_CATEGORY\_008 (Duplicate category), TC\_CATEGORY\_009 (XSS injection), TC\_CATEGORY\_010 (SQL injection), TC\_CATEGORY\_012 (Invalid parent category)

### Browser-wise Results:

Browser	Passed	Failed	Pass Rate
Chrome	11	4	73%
Firefox	11	4	73%
Edge	11	4	73%

**Analysis:** Lower pass rate due to more critical issues. Failures include duplicate detection, security vulnerabilities (XSS/SQL), and invalid parent category handling.

## 6.3 Overall Results

**Total Pass Rate:** 80% (40 passed / 50 test cases) **Total Executions:** 120 passed / 150 total (across 3 browsers)

**Browser Compatibility:**

- Chrome: 80% (40/50 tests passed)
- Firefox: 80% (40/50 tests passed)
- Edge: 80% (40/50 tests passed)

**Key Insights:**

- Excellent cross-browser compatibility - all browsers showed identical results
- Main issues are security-related (XSS and SQL injection vulnerabilities)
- Validation issues with duplicates and invalid inputs
- All failures are consistent and reproducible across browsers

**6.4 Test Execution Evidence****YouTube Video Link:**

- Sign Up Feature: <https://youtu.be/jVoj8h4NMIs>
- Search And Filter Feature: <https://youtu.be/p66u3v0ATdw>
- Create Category Feature: <https://www.youtube.com/watch?v=qJp62zZYnI4>

**7. Mantis Bug Reports****8. Self-Assessment Report**

No.	Criteria	Grade	Self-Assessed Grade
<b><u>1</u></b>	<b><u>Name of Feature 1 (missing any of the following: "report", "script" or "video" results in 0 points)</u></b>	<b><u>40</u></b>	<b><u>40</u></b>
	1.1 Report + Bug	15	15
	1.2 Test cases	5	5
	1.3 Script files	5	5
	1.4 Data files	5	5
	1.5 Videos	10	10
<b><u>2</u></b>	<b><u>Name of Feature 2 (missing any of the following: "report", "script" or "video" results in 0 points)</u></b>	<b><u>30</u></b>	<b><u>30</u></b>

	2.1 Report + Bug	10	10
	2.2 Test cases	5	5
	2.3 Script files	5	5
	2.4 Data files	5	5
	2.5 Videos	5	5
<b><u>3</u></b>	<b><u>Name of Feature 3 (missing any of the following: "report", "script" or "video" results in 0 points)</u></b>	<b><u>30</u></b>	<b><u>30</u></b>
	2.1 Report + Bug	10	10
	2.2 Test cases	5	5
	2.3 Script files	5	5
	2.4 Data files	5	5
	2.5 Videos	5	5
	<b><u>Total</u></b>	<b><u>100</u></b>	<b><u>100</u></b>