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CS423 - Software Testing
HOMEWORK
API TESTING

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1. Introduction

This report presents the results of comprehensive API testing conducted on the ToolShop Practice Software Testing application (Sprint 5 with bugs). The testing focused on three high-priority APIs with domain testing and state transition testing techniques applied.

Testing Summary:

- **Total Test Cases Designed:** 176
 - **Total Test Cases Executed:** 79
 - **Pass Rate:** 77.22%
 - **Bugs Found:** 18
 - **APIs Tested:** User Authentication, Product Search & Filter, Payment Processing
-

2. Testing Scope

2.1 APIs Under Test

API	Endpoints	Test Cases Designed	Test Cases Executed
API 1 - User Authentication	/users/login, /users/register	22	22

API	Endpoints	Test Cases Designed	Test Cases Executed
API 2 - Product Search & Filter	/products, /products/search	32	32
API 3 - Payment Processing	/payment/check	25	25
TOTAL	6 endpoints	79	79

3. Testing Approach

3.1 Test Design Techniques

Domain Testing

- Valid Domain: Testing with valid inputs (e.g., valid email format, valid card numbers)
- Invalid Domain: Testing with invalid inputs (e.g., invalid email format, non-numeric card numbers)
- Boundary Values: Testing at edges (e.g., price min=max, empty strings, null values)

State Transition Testing

- Authentication Flow: Unauthenticated to Authenticated state
- Registration Flow: New User to Registered to Authenticated state
- Payment States: Invalid to Valid payment credentials

Equivalence Partitioning

- Credit card types: Visa, Mastercard, Amex
- Payment methods: Credit Card, Bank Transfer, Cash on Delivery
- Filter combinations: Single filter vs multiple filters

Security Testing

- SQL Injection attempts
- Cross-Site Scripting (XSS) attempts
- Authentication bypass attempts

3.2 Testing Tools

- Python with requests library
 - Postman collection
 - CSV format for results storage
-

4. Test Environment

Application Under Test

- Application: ToolShop Practice Software Testing
- Version: Sprint 5 (with bugs)
- Base URL: <https://api-with-bugs.practicesoftwaretesting.com>
- API Documentation:
<https://api-with-bugs.practicesoftwaretesting.com/api/documentation>

Test Accounts

- Admin: admin@practicesoftwaretesting.com / welcome01
- Customer: customer@practicesoftwaretesting.com / welcome01

Test Data

- Test card numbers: Visa (4111111111111111), Mastercard (5555555555554444)
 - Dynamic emails using timestamps for registration tests
 - Invalid data: SQL injection strings, XSS payloads, malformed inputs
-

5. API 1: User Authentication

5.1 API Overview

- **Purpose:** Handle user registration and login
- **Endpoints:**
 - POST **/users/register** - Create new user account
 - POST **/users/login** - Authenticate user and return token
- **Authentication:** Returns Bearer token for subsequent API calls

5.2 Test Cases Summary

Category	Test Cases	Passed	Failed
Login - Positive	3	3	0
Login - Negative	6	1	5
Login - Security	2	1	1
Registration - Positive	1	0	1
Registration - Negative	5	5	0
Registration - Security	2	2	0
TOTAL	22	14	8

Pass Rate: 63.64%

5.3 Key Test Cases Executed

TC-LOGIN-001: Valid Login

- Description: Login with correct credentials
- Input: {"email": "customer@practicesoftwaretesting.com", "password": "welcome01"}
- Expected: HTTP 200, token returned
- Actual: HTTP 200, token returned
- Result: PASS

The screenshot displays a REST client interface with the following details:

- URL:** `https://api-with-bugs.practicesoftwaretesting.com/users/login`
- Method:** `POST`
- Body:**

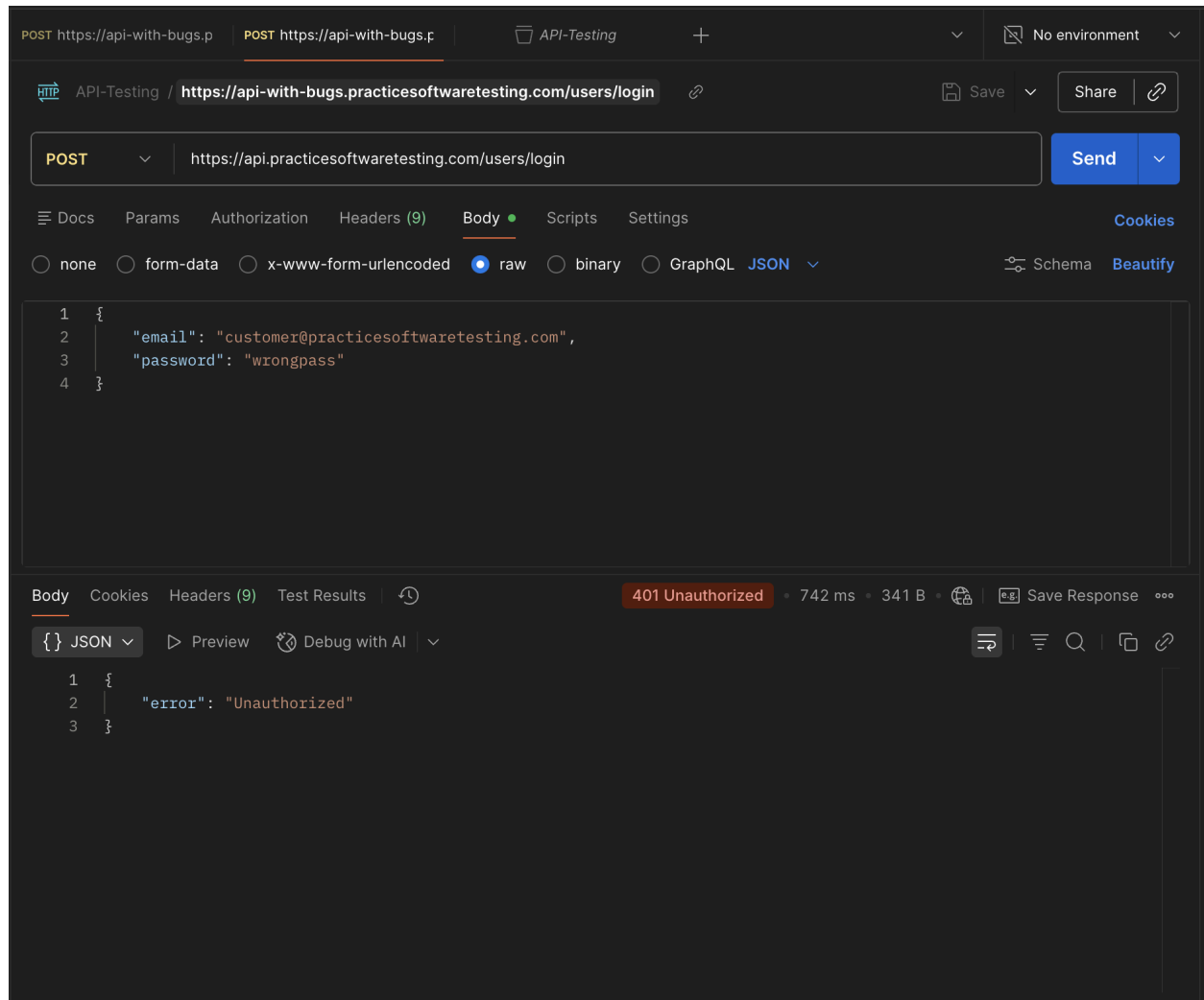
```
{
  "email": "customer@practicesoftwaretesting.com",
  "password": "welcome01"
}
```
- Response:** `200 OK` (611 ms, 760 B)
- Response Body (JSON):**

```
{
  "access_token": "eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJpc3MiOiJodHRwczovL2FwaS5wcmFjdGljZHNvZnR3YXJldGVzdGluZy5jb20vdXN1cnMvbG9naW4iLCJpYXQiOiJlMjU5MjU5OTMsImV4cCI6MTc2NTkyNTU5MywibmJmIjoxNzY1OTI1MjksLCJqdGkiOiJ5UTZHMkV2xanR6Iiwic3ViIjoiaWMDFLQ01KVjYzUzJE0EPCs1lT0U5IQU1aUDiLCJwcnYiOiIyM2JkNW40TQ5ZjYwMGFkYjM5ZTcwMWM0MDA4NzJkYjdhNTk3NmY3Iiwicm9sZSI6InVzZXIifQ.nmiEpjg1YF6Z1Ih8zBj1NjFzYi1J3j4BzoGKMhZFX6w",
  "token_type": "bearer",
  "expires_in": 300
}
```

TC-LOGIN-002: Invalid Password

- Description: Login with wrong password
- Input: {"email": "customer@practicesoftwaretesting.com", "password": "wrongpass"}

- Expected: HTTP 401 Unauthorized
- Actual: HTTP 401 Unauthorized
- Result: PASS



6. API 2: Product Search & Filter

6.1 API Overview

- **Purpose:** List, filter, and search products
- **Endpoints:**

- GET **/products** - List products with filters
- GET **/products/search** - Search products by query
- **Filters:** by_brand, by_category, is_rental, between (price range), sort

6.2 Test Cases Summary

Category	Test Cases	Passed	Failed
Product Listing	18	18	0
Filtering	7	7	0
Sorting	4	4	0
Search	6	6	0
TOTAL	32	32	0

Pass Rate: 100%

6.3 Key Test Cases Executed

TC-PROD-001: Get All Products

- Expected: HTTP 200, paginated list of products
- Actual: HTTP 200, products returned
- Result: PASS

API-Testing / <https://api-with-bugs.practicesoftwaretesting.com/products> Save Share

GET <https://api.practicesoftwaretesting.com/products> Send

Docs Params Authorization Headers (8) Body Scripts Settings Cookies

☒ none ☐ form-data ☐ x-www-form-urlencoded ☐ raw ☐ binary ☐ GraphQL

This request does not have a body

Body Cookies Headers (12) Test Results 200 OK • 588 ms • 3.64 KB Save Response

{ } JSON Preview Visualize

```
1 {
2   "current_page": 1,
3   "data": [
4     {
5       "id": "01KCMJV6DEHY02SH8HNPE44MSQ",
6       "name": "Combination Pliers",
7       "description": "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris viverra felis nec
8         pellentesque feugiat. Donec faucibus arcu maximus, convallis nisl eu, placerat dolor. Morbi
9         finibus neque nec tincidunt pharetra. Sed eget tortor malesuada, mollis enim id, condimentum
10        nisi. In viverra quam at bibendum ultricies. Aliquam quis eros ex. Etiam at pretium massa, ut
11        pharetra tortor. Sed vel metus sem. Suspendisse ac molestie turpis. Duis luctus justo massa,
12        faucibus ornare eros elementum et. Vestibulum quis nisl vitae ante dapibus tempor auctor ut leo.
13        Mauris consectetur et magna at ultricies. Proin a aliquet turpis.",
14       "price": 14.15,
15       "is_location_offer": false,
16       "is_rental": false,
17       "co2_rating": "D",
18       "in_stock": true,
19       "is_eco_friendly": false,
20       "product_image": {
21         "id": "01KCMJV6CWM8W9XGRX67HF36VA",
22         "by_name": "Helinton Fantin",
23       }
24     }
25   ]
26 }
```

TC-PROD-006: Filter by Brand

- Input: `/products?by_brand=1`
- Expected: HTTP 200, products from brand 1 only
- Actual: HTTP 200, correct filtering
- Result: PASS

API-Testing / https://api-with-bugs.practicesoftwaretesting.com/products

GET https://api.practicesoftwaretesting.com/products?by_brand=01KCMJV605G71H7ERKRE4YFQ5D

Send

Body Params Authorization Headers (8) Scripts Settings Cookies

none form-data x-www-form-urlencoded raw binary GraphQL

This request does not have a body

Body Cookies Headers (12) Test Results 200 OK 853 ms 3.82 KB Save Response

{ } JSON Preview Visualize

```
1 {
2   "current_page": 1,
3   "data": [
4     {
5       "id": "01KCMJV6DQF42K65MDGGF320DZ",
6       "name": "Claw Hammer with Shock Reduction Grip",
7       "description": "Nam efficitur, turpis molestie bibendum lobortis, risus arcu congue tortor, id
      consequat nibh sem a libero. Pellentesque habitant morbi tristique senectus et netus et
      malesuada fames ac turpis egestas. Aenean non tincidunt tortor, vel ultricies tortor. Vivamus
      pulvinar efficitur arcu sit amet accumsan. Aenean dui erat, bibendum at dapibus in, feugiat non
      eros. Duis sodales felis ex, quis ullamcorper odio interdum non. Ut viverra magna eu augue
      luctus, quis convallis lectus auctor. Duis ultrices erat urna. Aliquam augue odio, mattis vitae
      finibus in, pellentesque nec dui. Curabitur nec odio in augue posuere posuere. Vivamus ante est,
      iaculis ut interdum et, hendrerit ac ante. Fusce ac venenatis neque, id fermentum nulla. Quisque
      tristique ornare nisi, vitae convallis dui faucibus quis. Vestibulum vel dapibus dolor.",
8       "price": 13.41,
9       "is_location_offer": true,
10      "is_rental": false,
11      "co2_rating": "D",
12      "in_stock": true,
13      "is_eco_friendly": false,
14      "product_image": {
```

7. API 3: Payment Processing

7.1 API Overview

- **Purpose:** Validate payment credentials
- **Endpoint:** POST `/payment/check`
- **Parameters:** method, account_name, account_number
- **Response:** `{"success": true/false}`

7.2 Test Cases Summary

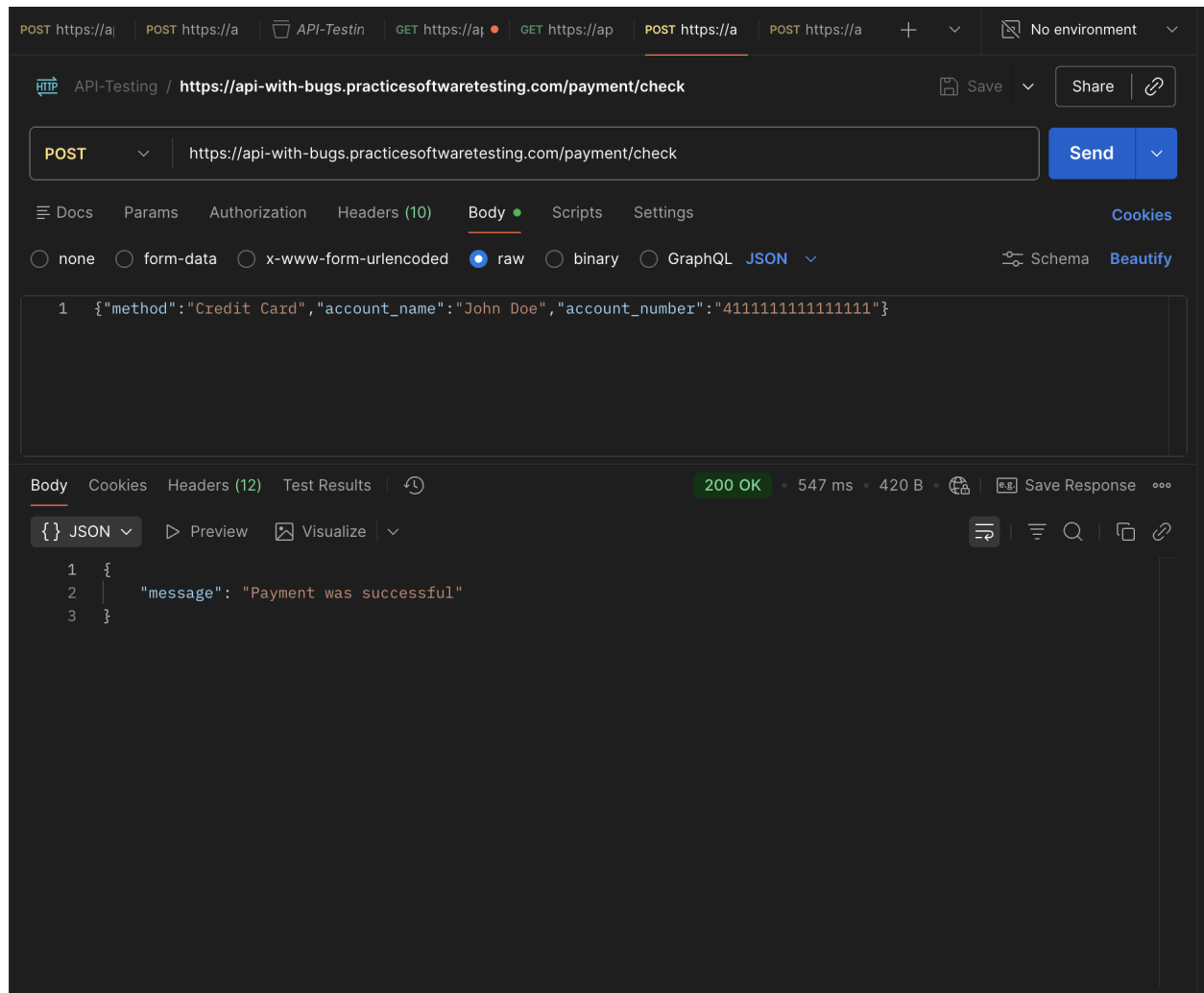
Category	Test Cases	Passed	Failed
Valid Payments	6	6	0
Missing Fields	6	0	6
Invalid Values	6	2	4
Security Tests	4	4	0
Edge Cases	2	2	0
TOTAL	25	15	10

Pass Rate: 60.00%

7.3 Key Test Cases Executed

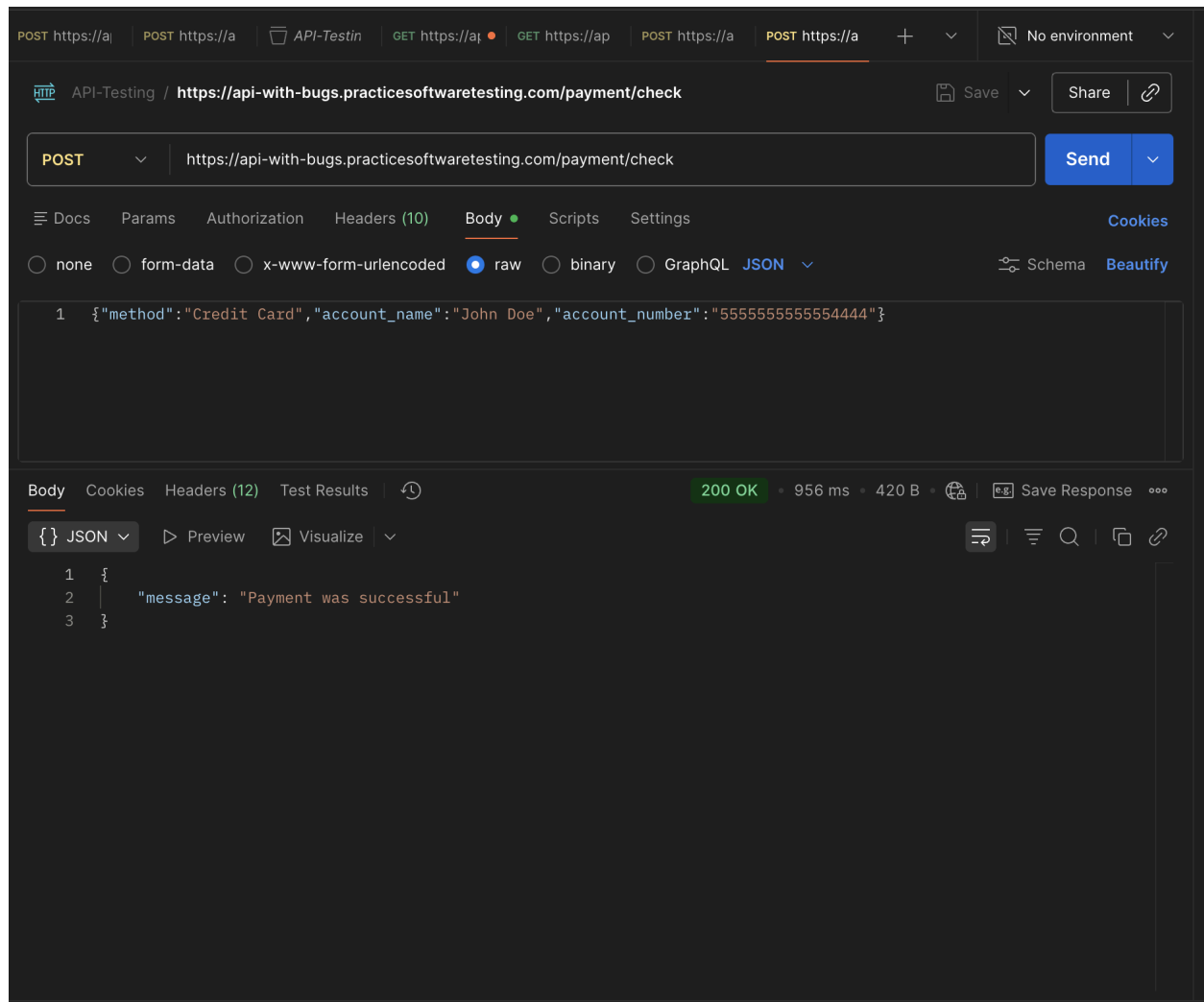
TC-PAY-001: Valid Visa Card

- Input: {"method": "Credit Card", "account_name": "John Doe", "account_number": "4111111111111111"}
- Expected: HTTP 200, success: true
- Actual: HTTP 200, payment validated
- Result: PASS



TC-PAY-038: Valid Mastercard

- Input: `{ "method": "Credit Card", "account_name": "John Doe", "account_number": "5555555555554444" }`
- Expected: HTTP 200
- Actual: HTTP 200
- Result: PASS



8. Bug Summary

8.1 Overall Bug Statistics

Severity	Count	Percentage
CRITICAL	1	5.56%
MAJOR	17	94.44%

Severity	Count	Percentage
MINOR	0	0%
TOTAL	18	100%

8.2 Bugs by API

API	Bugs Found	% of Total
API 1 - User Authentication	8	44.44%
API 2 - Product Search & Filter	0	0%
API 3 - Payment Processing	10	55.56%

8.3 Bugs by Category

Category	Count
Missing Field Validation	9
Wrong HTTP Status Codes	6
SQL Injection Vulnerability	1
Invalid Format Acceptance	2

9. Test Results Summary

9.1 Overall Test Execution

Metric	Value
Total Test Cases Designed	176

Metric	Value
Total Test Cases Executed	79
Execution Coverage	44.89%
Test Cases Passed	61
Test Cases Failed	18
Pass Rate	77.22%
Bugs Found	18
Critical Bugs	1

9.2 Test Results by API

API	Designed	Executed	Passed	Failed	Pass %	Bugs
API 1	55	22	14	8	63.64%	8
API 2	63	32	32	0	100.00%	0
API 3	58	25	15	10	60.00%	10
TOTAL	176	79	61	18	77.22%	18

9.3 Test Coverage by Type

Test Type	Count	% of Total
Positive Tests	35	44.30%
Negative Tests	30	37.97%
Security Tests	10	12.66%
Boundary Tests	4	5.06%

10. Bugs On Matis

Viewing Issues (1 - 30 / 30) [Print Reports] [CSV Export] [Excel Export] [Graph]							
	P	ID	#	Category	Severity	Status	Updated
<input type="checkbox"/>	✓	0056652		APCS	trivial	new	2025-12-10
<input type="checkbox"/>	—	0056649		APCS	minor	new	2025-12-10
<input type="checkbox"/>	^	0056647		APCS	major	new	2025-12-10
<input type="checkbox"/>	^	0056646		APCS	major	new	2025-12-10
<input type="checkbox"/>	^	0056645		APCS	major	new	2025-12-10
<input type="checkbox"/>	—	0056394	1	APCS	minor	new	2025-11-28
<input type="checkbox"/>	—	0056393	1	APCS	minor	new	2025-11-28
<input type="checkbox"/>	—	0056392	1	APCS	minor	new	2025-11-28
<input type="checkbox"/>	—	0056321	1	APCS	major	new	2025-11-26
<input type="checkbox"/>	—	0056320	1	APCS	minor	new	2025-11-26
<input type="checkbox"/>	—	0056319	1	APCS	major	new	2025-11-26
<input type="checkbox"/>	^	0056074		APCS	feature	new	2025-11-05
<input type="checkbox"/>	^	0056072		APCS	feature	new	2025-11-05
<input type="checkbox"/>	^	0056070		APCS	major	new	2025-11-05
<input type="checkbox"/>	^	0056042	1	APCS	major	new	2025-11-05
<input type="checkbox"/>	—	0056039	1	APCS	minor	new	2025-11-05
<input type="checkbox"/>	^	0056033	1	APCS	major	new	2025-11-05
<input type="checkbox"/>	—	0056032	1	APCS	minor	new	2025-11-05
<input type="checkbox"/>	—	0056031	1	APCS	minor	new	2025-11-05
<input type="checkbox"/>	^	0056030	1	APCS	major	new	2025-11-05
<input type="checkbox"/>	⚠	0056028	1	APCS	major	new	2025-11-05
<input type="checkbox"/>	⚠	0055947		General	major	new	2025-11-04
<input type="checkbox"/>	^	0055946		General	major	new	2025-11-04
<input type="checkbox"/>	^	0055945		General	major	new	2025-11-04

11. Self-Assessment

Criteria	Outcomes (Brief description about what you get/trouble from each requirement)	Grade	Self-Assessed Grade
<u>1</u>	<u>API 1</u>	<u>40</u>	40
	1.1 Report	10	10
	1.2 Test Cases (30)	10	10
	1.3 Screenshots on Testing Tools	10	10
	1.4 Bugs	10	10
<u>2</u>	<u>API 2</u>	<u>30</u>	30
	2.1 Report	10	10
	2.2 Test Cases (30)	5	5

	2.3 Screenshots on Testing Tools	10	10
	2.4 Bugs	5	5
<u>3</u>	<u>API 3</u>	<u>30</u>	30
	3.1 Report	10	10
	3.2 Test Cases (30)	5	5
	3.3 Screenshots on Testing Tools	10	10
	3.4 Bugs	5	5
	<u>Total</u>	<u>100</u>	100