

Bell-LaPadula Security Model Test Cases

Test Environment Setup

Users and Their Security Clearances

User Name	User ID	Clearance Level
Valentine Davis	ec187618-c564-425f-98af-281893f97660	Unclassified
Pauline Pugh	d807ce56-94e6-42ad-9549-9b8fd5881eb2	Top Secret
Brandon Lee	13dd39e9-45a2-446f-903a-291d02d965d0	Secret
Robert Yestur	4f23df30-59c5-4f37-b6b2-dd03a9c498f9	Confidential

Objects and Their Classification Levels

Object Type	Object ID	Classification Level
Mission Spec	e2a117a9-9918-4b26-8e96-7089529e34e5	Top Secret
Weapon Spec	39d40ba2-dcc5-4085-8d2d-ae85882b09f0	Secret
Mission Spec	5bcd110b-285f-4ec1-8d0a-ac1137aa10f1	Confidential
Weapon Spec	ff257089-4dfe-413c-94ac-b496d0eeefc5	Unclassified

Test Case 1: No Read Up (Simple Security Property)

Bell-LaPadula Rule: Users cannot read objects at a higher classification level than their clearance.

Test 1.1: Successful Read - Same Level ✓

User: Brandon Lee (Secret)

Object: Weapon Spec 39d40ba2... (Secret)

Operation: READ field "Name"

```
Enter the User Id you wish to simulate as: 13dd39e9-45a2-446f-903a-  
291d02d965d0  
Enter the Object Id you wish to touch: 39d40ba2-dcc5-4085-8d2d-  
ae85882b09f0  
Enter the operation you wish to preform (READ, WRITE): READ  
Weapon Spec:  
    Description (class java.lang.String)  
    Name (class java.lang.String)  
    Classification (class java.lang.String)  
Enter the field you wish to preform the operation on (case-  
sensitive): Name  
Miracle
```

→ **RESULT:** Read successful - user clearance matches object classification

Test 1.2: Successful Read - Lower Level ✓

User: Brandon Lee (Secret)
Object: Weapon Spec ff257089... (Unclassified)
Operation: READ field "Name"

```
Enter the User Id you wish to simulate as: 13dd39e9-45a2-446f-903a-  
291d02d965d0  
Enter the Object Id you wish to touch: ff257089-4dfe-413c-94ac-  
b496d0eeefc5  
Enter the operation you wish to preform (READ, WRITE): READ  
Weapon Spec:  
    Description (class java.lang.String)  
    Name (class java.lang.String)  
    Classification (class java.lang.String)  
Enter the field you wish to preform the operation on (case-  
sensitive): Name  
Bombastic Side Eye
```

→ **RESULT:** Read successful - user clearance exceeds object classification

Test 1.3: Failed Read - Higher Level ✗

User: Robert Yestur (Confidential)
Object: Mission Spec e2a117a9... (Top Secret)
Operation: READ field "Title"

```
Enter the User Id you wish to simulate as: 4f23df30-59c5-4f37-b6b2-  
dd03a9c498f9  
Enter the Object Id you wish to touch: e2a117a9-9918-4b26-8e96-  
7089529e34e5
```

Enter the operation you wish to preform (READ, WRITE): READ

Mission Spec:

Title (class java.lang.String)

Content (class java.lang.String)

Enter the field you wish to preform the operation on (case-sensitive): Title

→ **RESULT:** Access denied - "No Read Up" violation

java.lang.Exception: Access Denied [Simple Security Property]:

User 'Robert Yestur' (Confidential) cannot read object

'e2a117a9-9918-4b26-8e96-7089529e34e5' (Top Secret). No Read-Up allowed.

Test Case 2: No Write Down (Star Property)

Bell-LaPadula Rule: Users cannot write to objects at a lower classification level than their clearance.

Test 2.1: Successful Write - Same Level ✓

User: Robert Yestur (Confidential)

Object: Mission Spec 5bcd110b... (Confidential)

Operation: WRITE field "Title" with value "newTitle"

Enter the User Id you wish to simulate as: 4f23df30-59c5-4f37-b6b2-dd03a9c498f9

Enter the Object Id you wish to touch: 5bcd110b-285f-4ec1-8d0a-ac1137aa10f1

Enter the operation you wish to preform (READ, WRITE): WRITE
Mission Spec:

Title (class java.lang.String)

Content (class java.lang.String)

Enter the field you wish to preform the operation on (case-sensitive): Title

Enter Value: newTitle

Write Successful.

→ **RESULT:** Write successful - user clearance matches object classification

Test 2.2: Failed Write - Lower Level ✗

User: Robert Yestur (Confidential)

Object: Weapon Spec ff257089... (Unclassified)

Operation: WRITE field "Name" with value "newName"

```
Enter the User Id you wish to simulate as: 4f23df30-59c5-4f37-b6b2-
dd03a9c498f9
Enter the Object Id you wish to touch: ff257089-4dfe-413c-94ac-
b496d0eeefc5
Enter the operation you wish to preform (READ, WRITE): WRITE
Weapon Spec:
    Description (class java.lang.String)
    Name (class java.lang.String)
    Classification (class java.lang.String)
Enter the field you wish to preform the operation on (case-
sensitive): Name
Enter Value: newName
```

→ **RESULT:** Access denied - “No Write Down” violation

```
java.lang.Exception: Access Denied [Simple Security Property]:
User 'Robert Yestur' (Confidential) cannot write to object
'ff257089-4dfe-413c-94ac-b496d0eeefc5' (Unclassified). No Write-Down
allowed.
```

Test Case 3: Input Validation

Purpose: Verify system handles invalid inputs with appropriate error messages and retry prompts.

Test 3.1: Invalid User ID

```
Enter the User Id you wish to simulate as: 1234-5678
User does not exists (1234-5678) please try again: ec187618-c564-
425f-98af-281893f97660
```

→ **RESULT:** System detected invalid UUID format and prompted for retry

Test 3.2: Invalid Object ID

```
Enter the Object Id you wish to touch: abcd-efgh
Model does not exists (abcd-efgh) please try again: e2a117a9-9918-
4b26-8e96-7089529e34e5
```

→ **RESULT:** System detected non-existent object ID and prompted for retry

Test 3.3: Invalid Operations

```
Enter the operation you wish to preform (READ, WRITE): DELETE
```

Invalid operation (DELETE) please try again: REading

→ **RESULT:** System rejected unsupported operation (DELETE)

Invalid operation (READING) please try again: READ

→ **RESULT:** System rejected case-mismatched operation and prompted for retry with correct format

Summary

Test Results: - ✓ No Read Up enforcement: 3/3 tests passed - ✓ No Write Down enforcement: 2/2 tests passed - ✓ Input validation: 3/3 tests passed

Total: 8/8 test cases validated Bell-LaPadula security properties correctly